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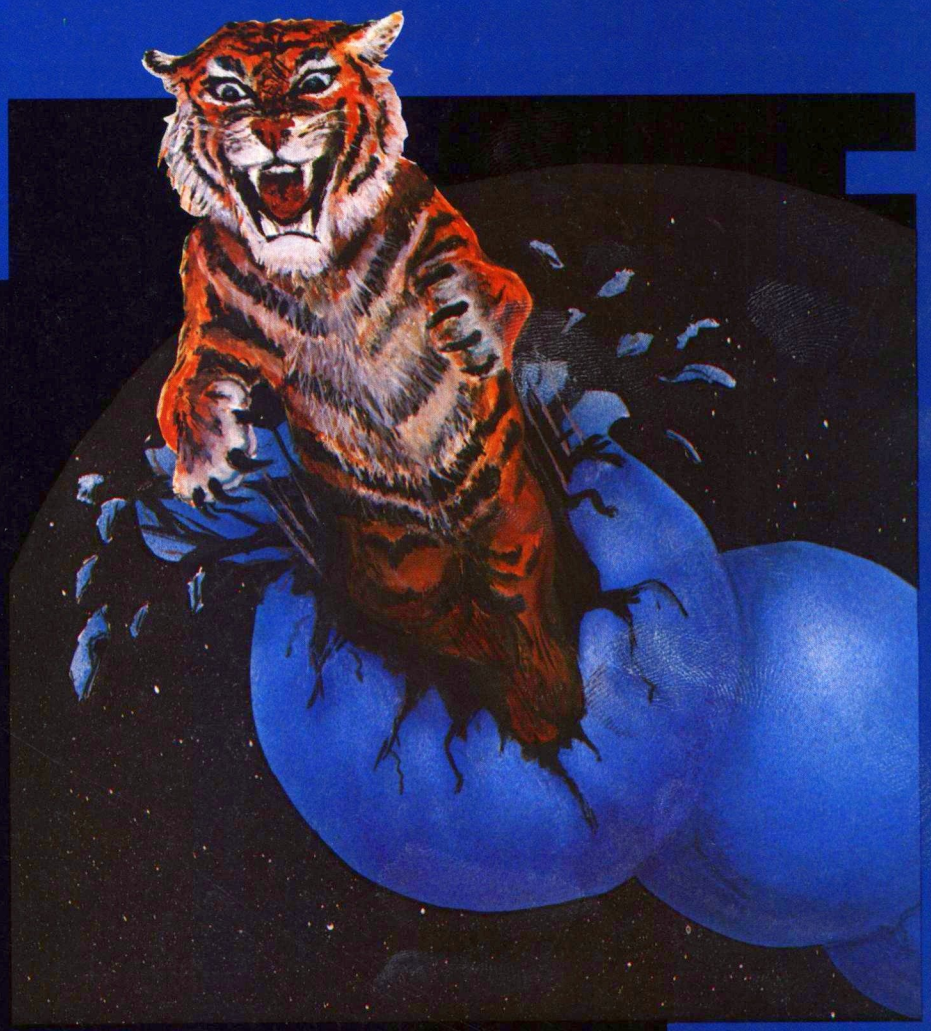

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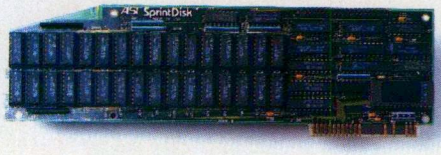

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VOLUME 9, NUMBER 4 APRIL 1986

Official Publication of **A.P.P.L.E. Co-op** "People Helping People with Personal Technology".

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The INNER CIRCUIT

Don Elman

The Computer as Pet

Notwithstanding the short-lived "pet-rock" phenomenon, it is often assumed that there are two kinds of people of this world–those who prefer dogs and those who prefer cats. Well, I'd like to suggest that a third breed has emerged in the last few years–those who prefer computers.

How, you say, can I even begin to compare a living, breathing, loving animal with that stationary box full of chips and circuits which just sits on your desk waiting to be poked? Now just consider what role a pet can play in your life. You walk in the house after a long, hard day and your nearly-human companion is there, always ready to interact with you as much or as little as you desire. While it may have constant, basic needs to satisfy at the expense of both your time and money, a pet will never criticize you nor outgrow its dependence on your nurturing care. Pets often are considered as "members of the family" with unique personalities, and can provide companionship both at work and play.

My contention is that more and more people are gaining these and other benefits from their home computers–without the drawbacks of harboring a living thing (no carpet stains, scratch marks, litter boxes, or unexpected litters to deal with). As soon as hardware manufacturers catch on to what is happening, I predict that we'll see new models in soft, furry cases that either purr (the //ct?) or slobber all over your hand (the //dg?) when you touch the keys.

In This Issue

Our animated group of features begins this month with **Master Cat** by David G. Sparks, which includes a program that declaws ProDOS' threatening directory structure. **Double Hi-res Logomaker** by Scott Anthony provides a convenient way of making customized graphic designs for display on both the screen and printer. In **Locking Out Control-C**, Mark Apfelstadt demonstrates how to put a finishing touch on a program so that it resists being disrupted even when your kitty decides to walk across the keyboard. As we kicked off the income tax season last December with a comprehensive spreadsheet article, this month we provide a service for you procrastinators who have barely enough time to check the arithmetic on your

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available on postpaid tear-off card inside.

Form 1040 before the deadline (**Deep in the Heart of Taxes** by Ed Sachs).

We're also pleased to introduce a new series by Michael and Lisa Storrie-Lombardi that should make artificial intelligence a little more intelligible. This will parallel their Macintosh-oriented series in our sister magazine, **Mac A.P.P.L.E.**. And if we're having enough trouble keeping quiet, there's the second part of Ed Sachs' **Sound Tester**. This tasty mixture, along with our regular departments for seasoning, should make a very tempting chow for your computer's food dish.

MEMBER BILLBOARD

April 1986

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Because of potential legal restrictions on shipping new computer hardware to other countries without an expensive export license, A.P.P.L.E. Co-op was previously unable to fulfill foreign orders for hardware products. However, we have recently determined that our products can be sent to **most** (but not all) countries without serious complications. Therefore, we now welcome foreign orders for hardware as well as software items that appear in our current catalogs and brochures. If we do receive an order from a country that may involve export problems, we will either contact you or return your money.

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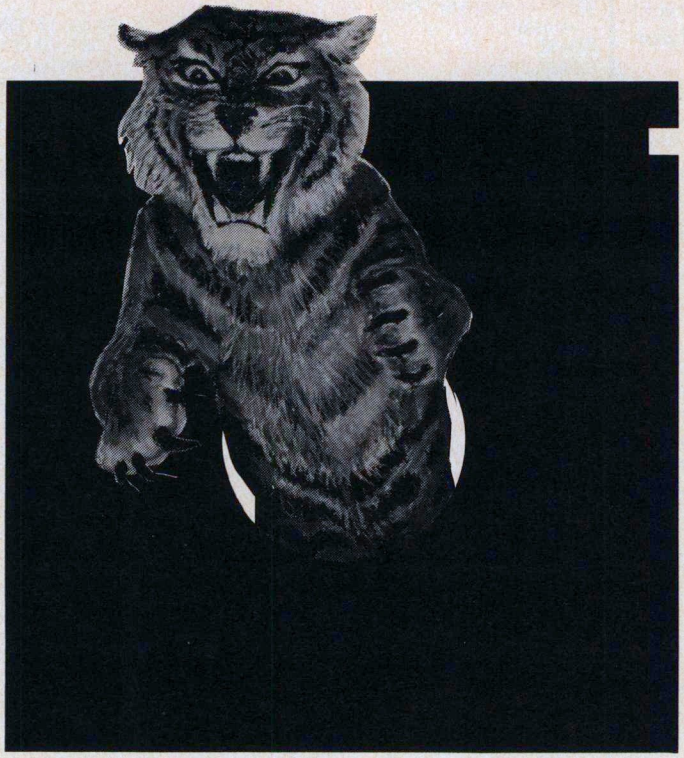
Master Cat



David G. Sparks

ALLERGIC to CATS? I have been surprised at how many of my Apple-owning friends resist ProDOS because of its flexible directory structure. This article presents a simple, Applesoft program which may help.

The idea of having more than one CATALOG on a single diskette is hard for some to chew. Yet it becomes almost essential to use multiple catalogs, better known as subdirectories, when stepping up to the larger storage devices such as a hard disk or Apple's UniDisk 3.5. It may be useful to contrast ProDOS with an older Apple disk scheme, DOS 3.3.

Disk Space Limitations

The familiar floppy diskette "holds" 143,360 characters of information. DOS 3.3 hogs 16,384 of the available capacity, leaving 126,976 characters, or "bytes," for files. The DOS 3.3 directory structure can keep track of up to 105 files in its single CATALOG. If you actually had that many files, you would tie up at least another 26,880 characters in housekeeping duty through so-called track-sector-lists. The average-length file on such a floppy would be 953 characters long, roughly 15 typewritten lines. But since disk space is allocated in 256-character "sectors," 953 characters would require 4 sectors with some waste in each file. If all files were over 768 bytes you would run out of sectors before the 105th file.

At the other extreme, a single, very large file could be built occupying all of the available space. It would require 4 track-sector-list sectors, reducing the maximum file size to 125,952 characters, or about 2,099 typewritten lines. The values are for standard DOS 3.3 diskette format.

ProDOS on a conventional floppy begins with the same number of characters available, 143,360, but reserves only 4,096 of them initially. A diskette is called a "Volume" in ProDOS. Half of the reserved characters (2048) are for the volume directory, which can keep track of up to 51 files. Even with a ProFile hard disk or the UniDisk 3.5, the volume directory is limited to 51 files. The remaining, initially reserved bytes are for housekeeping and the "stage one boot code."

Some ProDOS critics regard the 51-file limit of the volume directory as a shortcoming of ProDOS. Let us examine this. Storing 51 files using only the volume directory, the average file would be about 2,218 bytes long, or about 36 typewritten lines—half a page! As in DOS 3.3, it would not actually be possible to store the full

number of files of exactly that size. But such files are simply too small to be of more than trivial significance in most applications. In the case of a volume with a single, huge file, after deducting the record-keeping space, ProDOS leaves 137,728 characters available on a standard floppy. That's 11,776 more than DOS 3.3 allows, roughly 192 lines, or more than 3 additional, single-spaced, typewritten pages.

ProDOS Subdirectories

A case can already be made for ProDOS as an efficient user of the standard floppy. But what about the user who wants to put more than 51 files on a disk? First of all, why would anyone want such a large number of files on one volume? With "only" about 138,000 characters available on a 5 ¼ inch floppy, and floppy disks so cheap, almost nobody would. But with hard disks and the UniDisk 3.5 able to hold many diskettes' information, it makes good sense to plan for hundreds of files on a single volume. That is where subdirectories come in. Apart from the capacity of the disk device itself, there is no limit to the number of files in a subdirectory.

ProDOS users can create subdirectories using the FILER from the system utilities disk, or with the CREATE command. A subdirectory is "reached" by giving its pathname, or by setting the prefix. Once set up, a subdirectory is as easy to use as an ordinary CATALOG. The only difference is that the CATALOG command will only list the files in the directory you specify, though it will tell you how much of the total disk capacity is available.

With some thought on the user's part, ProDOS permits efficient organization of hundreds of files on a single disk drive. But my reluctant friends tell me they like seeing all of the files on a disk arranged in a single list. Would it help, I wondered, if I could give them a program which would "round up" a disk's ProDOS directories? And wouldn't it be well to do it entirely in Applesoft with no tricky machine code attached?

The Program

I always try to learn something with every program I write. For this one, I needed to know how ProDOS handles its file directories. I also thought I'd have some fun with three lesser-used Applesoft features: defined functions, LOMEM, and the SGN function.

ProDOS directories are files, and can be handled just like any other file. One way to examine a directory is to BLOAD it. For example, to examine the directory of a diskette named "/MASTER," the command would be, "BLOAD /MASTER, A$2000, TDIR." Using PEEK you could then examine the directory information. All directory entries are the same length. The first entry in a directory has information about that directory, while all the rest describe the files in that directory. The layout of directory entries is given in the following table:

DIRECTORY INFORMATION

Relative Item	Entry Byte
Directory Name Length	$00(Lo)
Directory Name	$01-$0F
Entry Length	$1F
Entries per Block	$20
Active files in this directory	$23,$24

FILE INFORMATION

File status / File Name Length	$00
File Name	$01-$0F
File Type	$10

The program processes directory blocks one at a time, using the "B" and "L" parameters to select the block. To ensure a safe buffer, the program begins with a LOMEM instruction, inserting the buffer between the program and its variables. It then defines two functions, LNYB and HNYB, which return the value

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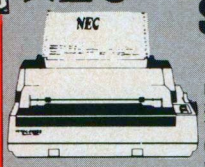

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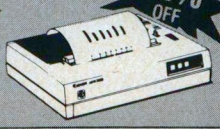

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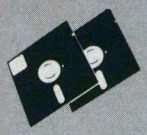

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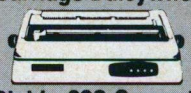

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of the lower and upper nybbles, respectively, of a byte. The filename length, for example, is the low nybble of the first byte in a directory entry.

The program DIMensions a large string array, and an equal-sized integer array, which will work together as a linked list of directory names. As written, the program will handle up to 200 directories, which is a lot to have on one disk. You can change this number in line 150. There is enough memory in a 64K Apple to handle up to 1600 directories with this program, more than could be physically present on even the new UniDisk 3.5.

Finally, the program walks through the directories, examining all file entries, adding any further subdirectories to the list. After each directory has been examined, its pathname, file count and block usage are printed, followed by a standard ProDOS CATALOG. The program ends after handling the last directory on the disk.

An effort was made to keep directory catalogs from crossing a page boundary. If your directories are longer than 43 files, they will cross the perforations on letter-size paper. But if this were DOS 3.3, there would be nothing you could do about it, would there? Come to think of it, with only 24 lines on the screen, what was ever so great about those long directories anyway? Now that you have ProDOS, why not use your keen intellect to divide those big directories into smaller subdirectories?

Listing 1 Master Cat

```
110 LOMEM: PEEK (105) + PEEK (106) * 256 + 512:
    BUFFER = PEEK (105) + PEEK (106) * 256 - 512:
    REM MAKE ROOM FOR BLOAD BUFFER
120 DEF FN LNYB(Q) = ((Q / 16) - INT (Q / 16)) * 16
130 DEF FN HNYB(Q) = INT (Q / 16)
140 D$ = CHR$ (4)
150 DIM PTR(200),DIR$(200):
    REM CAN BE AS LARGE AS 1600!
160 TEXT :
    HOME
170 PRINT "PRODOS MASTER VOLUME DIRECTORY":
    PRINT :
    PRINT "ENTER VOLUME NAME";:
    INPUT ": ";DIR$(1):
    IF LEFT$ (DIR$(1),1) = "/" THEN
       DIR$(1) = MID$ (DIR$(1),2):
       IF RIGHT$ (DIR$(1),1) = "/" THEN
          DIR$(1) = LEFT$ (DIR$(1), LEN (DIR$(1)) - 1)
180 RECNUM = 1
190 PRINT :
    INPUT "DATE: ";DT$
200 DASH$ = "----------------------------------------"
210 PRINT D$;"PR#1":
    PRINT :
    PRINT :
    LPRT = 3
220 REM BUILD CATALOG COMMAND STRING
230 DIRNUM = DIRNUM + 1:
    REM STORE THIS NUMBER IN CURRENT RECNUM OF A FOUND DIR FILE
240 PTH$ = "/" + DIR$(DIRNUM):
    TNUM = DIRNUM
250 IF PTR(TNUM) < > 0 THEN
       TNUM = PTR(TNUM):
       PTH$ = "/" + DIR$(TNUM) + PTH$:
       GOTO 250
260 BNUM = 0:
    REM START WITH BLOCK 0 OF DIR FILE
270 PRINT D$;"BLOAD";PTH$;",TDIR,L512,B";BNUM * 512;",A";BUFFER:
    BPTR = 4:
    BFILES = 0:
    ON BNUM > 0 GOTO 330
280 ELNGTH = PEEK (BUFFER + 35):
    NFILES = PEEK (BUFFER + 37) + PEEK (BUFFER + 38) * 256:
    BLFILES = PEEK (BUFFER + 36)
290 PROCESSED = 0:
    BPTR = 43:
    BFILES = 1
300 IF ((LPRT + NFILES + 12) > 61) THEN
       PG = PG + 1:
```


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There are faster algorithms around to do this, no doubt using assembly language, recursive programming, or both. But here is a surprisingly effective solution using only the standard-issue tools available to an amateur. Having bought a UniDisk 3.5, I already begin to appreciate this simple program. And perhaps it is more appropriate that it be a separate program, rather than a built-in command. Resident commands take up valuable memory; special programs are only present when they are running. An overall MASTER CATALOG may only need to be taken occasionally. Special "system utilities" like this are commonly found in large-scale computer operations, so why not our Apples?

Our computers are growing up—with RAM in megabytes, disks in multimegs—and my friends who cling fondly to the little disks and DOS of their Apples' twighoods must, like loving parents, grow in spirit with them. 'Nuf said.

P.S. If you insist on having lots of files on a disk, and all of them in one ProDOS directory, do this: 1) format your disk with the volume name, "X"; 2) if you plan to boot this volume, store a copy of PRODOS, BASIC.SYSTEM and your STARTUP on it; 3) CREATE one subdirectory, say, "YZZY" or some such thing; 4) set PREFIX/X/YZZY. From that point you may add files to your heart's content, even beyond the curious, antique, paltry limit of 105 imposed by DOS 3.3!

```
      FOR X = LPRT TO 63:
         PRINT :
      NEXT :
      PRINT "                                        PAGE ";PG; CHR$ (12):
      PRINT :
      LPRT = 3
310 IF LPRT = 3 THEN
      PRINT "PRODOS TOTAL VOLUME CATALOG OF /";DIR$(1);"       DATED: ";DT$
320 LPRT = LPRT + NFILES + 12
330 NAMELGTH = FN LNYB( PEEK (BUFFER + BPTR)) * SGN ( FN HNYB( PEEK (BUFFER +
      BPTR))):
    BFILES = BFILES + 1:
    IF NAMELNGTH = 0 THEN
      360
340 PROCESSED = PROCESSED + 1:
    IF PEEK (BUFFER + BPTR + 16) = 15 THEN
      RECNUM = RECNUM + 1:
      PTR(RECNUM) = DIRNUM:
      FOR X = 1 TO NAMELNGTH:
         DIR$(RECNUM) = DIR$(RECNUM) + CHR$ ( PEEK (BUFFER + BPTR + X)):
      NEXT
350 NBLOCKS = NBLOCKS + PEEK (BUFFER + BPTR + 19) + PEEK (BUFFER + BPTR + 20)
      * 256
360 IF (BFILES < BLFILES) AND (PROCESSED < NFILES) THEN
      BPTR = BPTR + ELNGTH:
      GOTO 330
370 IF (PROCESSED < NFILES) THEN
      BNUM = BNUM + 1:
      GOTO 270
380 TFILES = TFILES + NFILES
390 PRINT " ";DASH$;DASH$:
    PRINT PTH$;":  ";NFILES;" FILES":
    PRINT :
    PRINT "DATA BLOCKS: ";NBLOCKS;:
    BNUM = 4 * (DIRNUM = 1) + (1 + BNUM) * (DIRNUM > 1):
    PRINT "   DIR BLOCKS: ";BNUM;"   TOTAL: ";NBLOCKS + BNUM
400 NBLOCKS = 0:
    IF NFILES > 0 THEN
      PRINT D$;"CATALOG";PTH$:
      GOTO 420
410 LPRT = LPRT - 8:
    REM DEDUCT CATALOG OVERHEAD FROM LINES PRINTED
420 IF DIRNUM < RECNUM THEN
      230
430 FOR X = LPRT TO 63:
      PRINT :
    NEXT :
    PRINT "                                        PAGE ";PG + 1
440 PRINT D$;"PR#0":
    PRINT D$;"PR#3"
```


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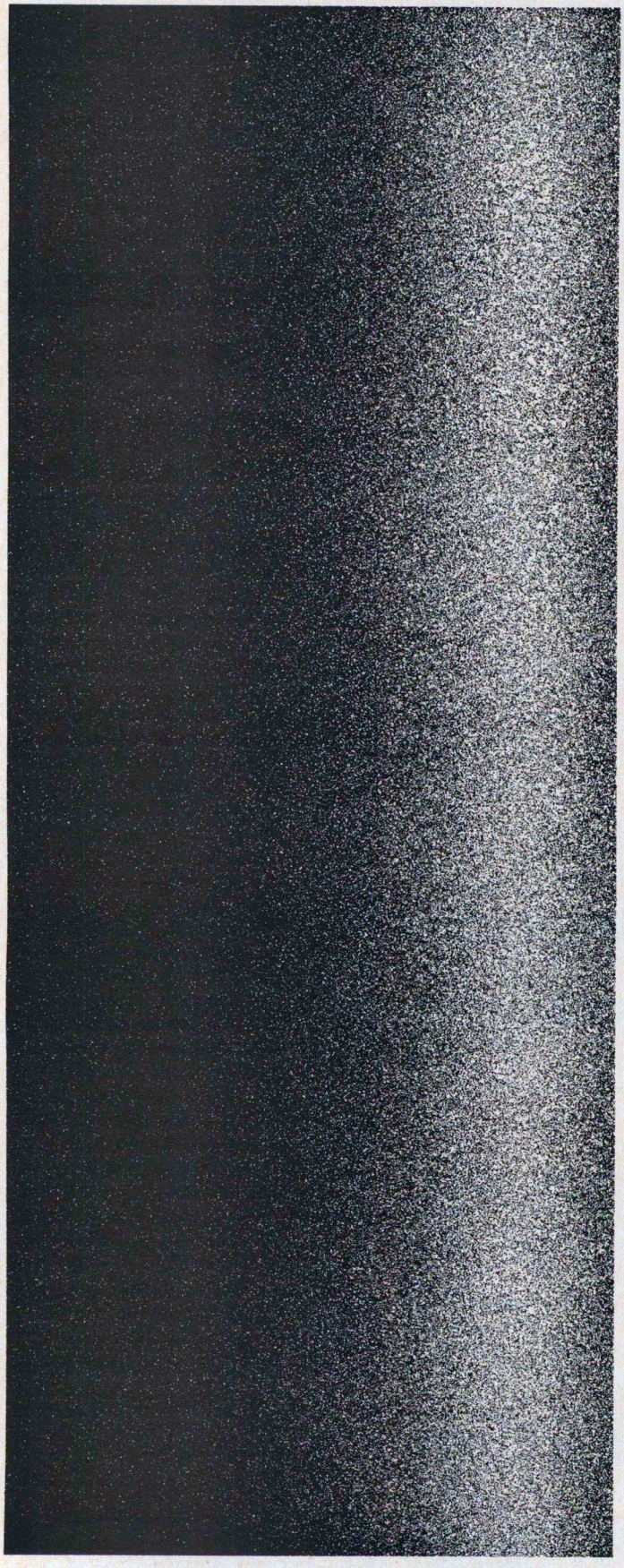


Double Hi-res Logomaker

Scott Anthony

NORMALLY, when you want to print any kind of Apple hi-res graphics image you need to first BLOAD an image, display it on the hi-res screen, and then use a standard screen dump utility to print it out. DHR.LOGOMAKER bypasses all this by creating a table in memory that the printer uses directly. It does not have to display anything on the screen. Once the table has been created, it can be saved and reloaded into almost any program. Using DHR.LOGO-PRINT, the table can be printed at any time, providing you with custom letterheads, logos (whence the program's name), and other special graphics images from within a program.

The four "modules" I have written here allow you to make these graphic tables and print them. However, you first need to create or load a double-hi-res image and display it. To do this you need an Apple *//c* or a *//e* with an extended 80-Column card with a revision "B" or later motherboard. There are any number of painting and drawing programs now on the market which will allow you to produce suitable double-hi-res images. The images need to be saved as two hi-res pages of the same name with the postfixes "1" and "1X" appended to them.

Using the Programs

Once you have a double-hi-res image saved or displayed on the screen, RUN DHR.LOGOSCAN (Listing 1). This is a BASIC driver which loads a couple of machine language routines, DHR.SCREENMOVES (Listing 2) and DHR.LOGOMAKER (Listing 3), and sets them up to be CALLed. The menu that appears will prompt you to reload your image if it isn't already there. The short routine DHR.SCREENMOVES is required when reloading double-hi-res images. It uses the 80-Column firmware subroutine AUXMOVE to move hi-res Page 1 from main to auxiliary memory.

After your image appears, press any key to return to the menu, and choose the SCAN option. The screen will flash between displaying the double-hi-res image and normal hi-res page 2 which is blank except for an "L" shaped cursor. This cursor can be moved around the screen with your joystick. First, move the cur-

sor to the upper left of the image block you want to include in your table, and then press the Open-Apple key. This sets the upper left coordinate point. Press any key to continue, and move the cursor to the lower right of the image block you want to save. Again press the Open-Apple key. This sets the lower right coordinate point. Once these points are set, the program asks if you are satisfied with them. If so, the machine language routine DHR.LOGOMAKER takes over, scans the image and forms the graphic table at A$6000.

After naming the scanned block, you should direct the program to BSAVE it for later use.

To use the scanned block from a BASIC program, you need to BLOAD DHR.LOGOPRINT and BLOAD [name of table]. DHR.LOGOPRINT (Listing 4) will allow up to two tables to be printed so that, for example, an image could be placed at the top left and right of a letterhead or an invoice form. The first table should be BLOADed at A$4000, and the second at A$6000. A few pokes are necessary to set up the printing routine. They are:

POKE 8, [low order number of dot spaces between the tables]
POKE 9, [high order number of dot spaces]

In practice, the maximum number of dots that can be printed between two "tables" (on a normal width printer) is about 400. If you make your printout too wide (total width of left margin, both tables, and the space between them), expect your printer to do some odd things. You will probably need to waste a couple of sheets of paper and experiment with the placement of the images and the number of dots between them for each application.

POKE 239, [left margin setting]
POKE 250, [relative vertical position of image 1]
POKE 251, [relative vertical position of image 2]

The last two POKEs need a bit of explanation. DHR.LOGOPRINT allows you to print one image higher or lower than the other on the paper. It determines when to start printing by looking at an "offset" number for each table in memory locations 250 and 251. The actual numbers placed in those locations don't matter all that much, only the difference between them. For example, if you wanted the left hand image to be three lines higher than the right hand image, you would POKE 250,0 and POKE 251,3. You could just as well POKE 250,20 and POKE 251,23 since the difference between the two values is what counts. Also, the offset is in whole "printer" lines which are really made up of 7 horizontal rows of dots. This was necessary to simplify the bit-twiddling used in the routine.

About Printers

The printing routines are written for Epson type printers, meaning any brand that uses Epson control sequences. It seems that the dot matrix printer world can be loosely broken down into two major groups—those with the upper pin of the printhead corresponding to the high bit of the data sent out, and those with the upper pin being the low bit. Epson types are of the first group. This group also includes the Star Micronics (Gemini's, SG's, etc.), Panasonics, and others. In order to use DHR.LOGOPRINT on printers of the other group, you will have to invert each byte of either the data stored by DHR.LOGOMAKER or each byte as it is sent out to the printer. Also, each control sequence (lines 314-319 of Listing 4) will probably have to be modified for your printer. I am working on this now.

Why 7 rows? I always print dot graphics from machine language 7 rows per line because many printers get *real confused* if presented with a number greater than decimal 127. Any number greater than 127 has the high bit set, and usually signals the printer to spit out its own block graphics characters or some other alternate character set, and gets things really messed up.

Speaking of printer quirks, much of the code of LOGOPRINT is devoted to calculating or otherwise determining the EXACT number of dots to print on each pass of the printhead. If one too few dots is sent, the printer will attempt to print a command as a graphic image, which not only looks funny, but messes up the command which should have followed. If, on the other hand, one too many dots gets sent out, the printer interprets the graphic information as a command, resulting in really strange behavior, like eight "beeps" followed by 200 line-feeds, followed by a string of characters looking like the printer is swearing at you—which it is!

Summing Up

From BASIC, BLOAD LOGOPRINT. Then, whenever you want the images printed, do the required POKEs and then CALL 32768 from the program. I have included a demonstration program, DHR.LOGOPRINT DEMO (Listing 5), to show how the printing looks. If you are interested in purchasing the programs on a disk, you will also get a few sample tables and a double-hi-res picture to do sample scans.

If you have an assembler, type in the assembly listings as shown. DHR.LOGOPRINT and DHR.LOGOMAKER load and execute at $8000 (32768 decimal) and DHR.SCREENMOVES loads at $300 (768). If you don't have an assembler, enter the monitor with a CALL -151 and type only the leftmost columns in the listing. The easiest way to do this, and the least prone to error, is to type the address followed by the two or three two-digit hex

LISTING 1

```
1   REM  ************************
2   REM  *                      *
3   REM  *     DHR.LOGOSCAN     *
4   REM  *                      *
5   REM  *  COPYRIGHT (C) 1985  *
6   REM  *          BY          *
7   REM  *    SCOTT ANTHONY     *
8   REM  *                      *
9   REM  ************************
10  AL = 32771:AR = 32773:AY = 32775:AB = 32776:DHR =
     33216:KILL = 33232:S2 = 33251:START = 32768
15  PRINT  CHR$ (4);"BLOAD DHR.SCREENMOVES"
20  HGR2 : HCOLOR= 3: HGR : TEXT
30  PRINT  CHR$ (4);"BLOAD DHR.LOGOMAKER"
60  GOTO 5000
78 :
80  REM  ************************
81  REM  * THE FOLLOWING CODE *
82  REM  * IS FOR USE WITH    *
83  REM  * THE COMPUTECH      *
84  REM  * VIDEO DIGITIZER    *
85  REM  * AND VIDEO FIRMWARE *
86  REM  * CARD. DELETE LINES *
87  REM  * 100 TO 150 IF YOU  *
88  REM  * DO NOT HAVE THESE  *
89  REM  * CARDS INSTALLED.   *
90  REM  ************************
100  HOME : VTAB 8: HTAB 1
105  PRINT
110  PRINT  CHR$ (4);"IN#5"
120  PRINT "PRESS CTRL-A TO INITIALIZE FIRMWARE CARDA
     ND GET IMAGE"
130  PRINT : PRINT "PRESS <T> TO RETURN TO TEXT SCREE
     N"
140  PRINT : PRINT "AND <CTRL>-<Z> TO TURN FIRMWARE C
     ARD OFF"
142  GET A$: PRINT A$
145  PRINT  CHR$ (4);"IN#0"
150  RETURN
1000  HOME
1005  POKE 230,64: REM  SHOW PAGE 1, DRAW ON PAGE 2
1010  CALL DHR: FOR N = 1 TO 40: NEXT : CALL S2: GOSUB
     2000
1020  IF  PEEK ( - 16287) < 128 THEN  GOTO 1010
1030 XL = 2 * X:YT = Y: TEXT : HOME : PRINT "XL = ";X
     L: PRINT : PRINT ":YT = ";YT
1040  POKE AL, INT (XL / 256): POKE AL + 1,XL - (256 *
      INT (XL / 256))
1050  POKE AY,YT
1070  PRINT "PRESS ANY KEY TO CONTINUE": GET A$
1080  CALL DHR: FOR N = 1 TO 40: NEXT : CALL S2: GOSUB
     2010
1090  IF  PEEK ( - 16287) < 128 THEN  GOTO 1080
```

Continued

bytes you see (e.g., 8000:4C 0A 80 [Return]). Be sure you do *not* put a space after the colon, but *do* put a space between the hex bytes.

I use these routines often. All the invoices I send out are set up using a "homebrew" BASIC program and have the logo of my business printed in the upper left hand corner. It would also be possible to interface them to a word processor to allow artwork to be interspersed with text.

Fig. 1. Table named "LT.FLORAL" printed twice at the same vertical position, printed 200 dots apart.

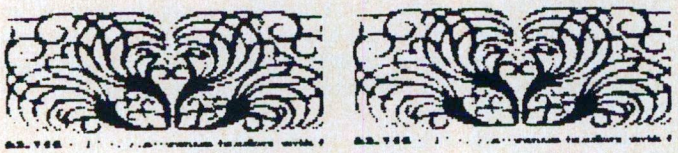
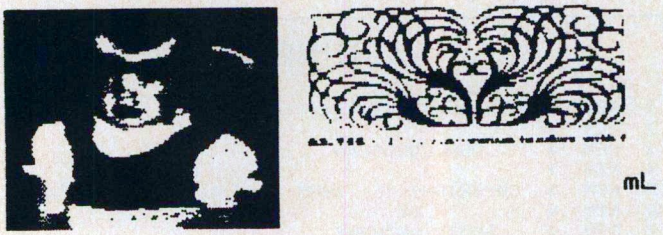


Fig. 2. Table named "ALIX" (my daughter) and table named "LT.FLORAL" printed at vertical positions offset by 2 printer lines and spaced 200 printer dots apart.



mL

```
1100 XR = 2 * X:YB = Y: TEXT : HOME : VTAB 8: HTAB 8:
     PRINT "XR=";XR;: HTAB 20: PRINT "YB=";YB: HTAB
     8: PRINT "XL=";XL;: HTAB 20: PRINT "YT=";YT: PRINT
     : HTAB 2: PRINT "BIT WIDTH=";XR - XL + 1;: HTAB
     16: PRINT "HEIGHT=";YB - YT: HTAB 1: PRINT "BYTE
     WIDTH "; INT ((XR - XL + 1) / 7) + 1
1102 H = YB - YT + 1:W = XR - XL + 1:BW =  INT ((XR -
     XL + 1) / 7) + 1:TL = ( INT (H / 7) + 1) * (BW *
     7) +  INT (H / 7) + 1
1105  PRINT : PRINT "TOTAL BYTES ";TL: PRINT "IS THIS
     O.K.? ";: GET A$
1107  IF A$ =  CHR$ (27) THEN  RETURN
1108  IF A$ <  > "Y" THEN  GOTO 1000
1110  POKE AR, INT (XR / 256): POKE AR + 1,XR - (256 *
     INT (XR / 256)): REM  HI-BYTE FIRST
1120  POKE AB,YB
1135  CALL START
1140  PRINT : PRINT "DONE. . .": PRINT : PRINT "PRESS
     <ESC> FOR MENU OR ANY OTHER       KEY TO DO OVE
     R AGAIN"
1150  GET A$: PRINT
1160  IF A$ =  CHR$ (27) THEN  RETURN
1170  GOTO 1000
2000  POKE  - 16302,0: POKE  - 16299,0:X =  INT (1.05
     *  PDL (0)):Y =  INT (.72 *  PDL (1)): HCOLOR=
     3: HPLOT X,Y TO X + (8 * (X < 279)),Y: HPLOT X,Y
     TO X,Y + (8 * (Y < 191)): HCOLOR= 0: HPLOT X,Y TO
     X + (8 * (X < 279)),Y: HPLOT X,Y TO X,Y + (8 * (
     Y < 191)): RETURN
2010  POKE  - 16302,0: POKE  - 16299,0:X =  INT (1.05
     *  PDL (0)):Y =  INT (.72 *  PDL (1)): HCOLOR=
     3: HPLOT X,Y TO X - (8 * (X > 8)),Y: HPLOT X,Y TO
     X,Y - (8 * (Y > 8)): HCOLOR= 0: HPLOT X,Y TO X -
     (8 * (X > 8)),Y: HPLOT X,Y TO X,Y - (8 * (Y > 8)
     ): RETURN
2020  RETURN
4000  HGR : TEXT : HOME : CALL KILL: GOSUB 7000: VTAB
     8: HTAB 1: PRINT "CURRENT DRIVE IS "DR: INPUT "T
     YPE THE NAME OF IMAGE: ";IM$
4010  IF IM$ = "C" THEN  GOTO 4180
4020  IF IM$ = "D" THEN  GOSUB 7300: GOTO 4000
4025  GOSUB 7100
4030  PRINT  CHR$ (4);"BLOAD"IM$"1X,D"DR
```

Continued

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All times in seconds. (Time Test programs available)		DAVID DOS-II	ProDOS	DOS 3.3
TEXTFILES (100 Sectors)	TSAVE	8.0	NO	NO
	TLOAD	6.2	NO	NO
(791 Strings, 32 chars ea)	WRITE	29.3	28.0	88.4
	READ	24.3	16.3	83.8
	PRINT/READ	44.2	45.9	117.1
(442 Sectors, 7 x 500)	APPEND	142.3	142.9	1231.2
APPLESOFT (100 Sectors)	*SAVE	6.4	16.4	33.1
	LOAD	5.0	4.0	23.5
INTEGER (100 Sectors)	*SAVE	6.6	NO	33.4
	LOAD	4.9	NO	23.4
BINARY (100 Sectors)	*BSAVE	7.3	18.4	28.7
	BLOAD	5.8	4.8	24.5
48K PROGRAM SPACE (With 3 Bufs avail)	APPLESOFT	36,352	NO	36,352
	INTEGER	36,352	NO	36,352
	BINARY	36,352	34,816	36,352
64K PROGRAM SPACE (With 4 Bufs avail)	APPLESOFT	46,592	32,256	35,756
	INTEGER	46,592	NO	35,756
	BINARY	46,592	41,728	35,756

*Add 5 seconds for Verify. Apple II, Applesoft & ProDOS are trademarks of Apple

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2. FRE makes ultra-fast garbage collection.
3. DATE stamp files. Clock or manual dating.
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5. TSAVE speed saves Text Files from memory.
6. TLIST lists all Text Files to screen/printer.
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8. DISA disassembles Binary to screen/printer.
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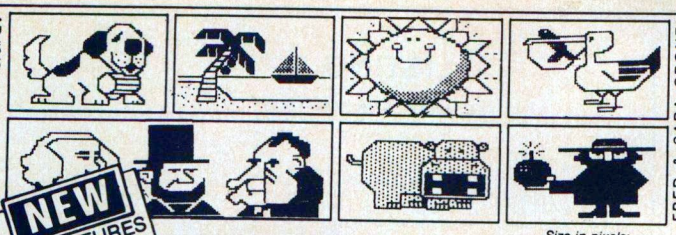

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NEW

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```
1 HOME: INVERSE: PRINT CHR$(21)
2 X=RND(1)*24+1: VTAB X: HTAB X:
  PRINT X;: HTAB 26-X: PRINT X;: GOTO 2
```

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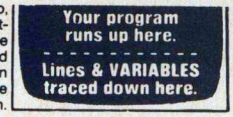
"Live" tracing too, with each executing statement, line no. and selected variable value in a window at the bottom of screen.



BREAKPOINTS: Your program stops when you want. For example, when X gets set to 99, or the 3rd time a Gosub occurs.

LIGHTNING-FAST FIND: Find strings & variables *fast*—search big programs in apx. *2 seconds*—very useful! D Code is fully-transparent to your programs, and compatible with GPLE, Double-Take, etc.

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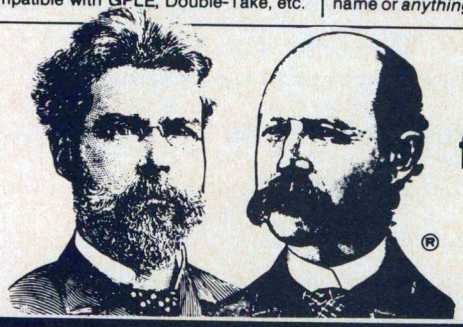

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CIRCLE 11 READER SERVICE CARD

```
4040  GOSUB 7100
4050  PRINT  CHR$ (4);"BLOAD"IM$"1,D"DR
4060  CALL DHR
4070  GET A$: PRINT : CALL KILL:DR = 1: RETURN
4180  PRINT : PRINT  CHR$ (4);"CATALOG,D"DR: GET A$: PRINT
    A$
4190  GOTO 4000
4200  TEXT : HOME : CALL KILL: VTAB 8: HTAB 1: PRINT
    "TYPE THE NAME OF IMAGE TO SAVE": PRINT : INPUT
    IM$:IM$ = "LT." + IM$
4210  PRINT : INPUT "TO DRIVE ";DR: IF DR < 1 OR DR >
    2 THEN 4210
4215 TL =  PEEK (5) + (256 *  PEEK (6)) - 24575
4220  PRINT  CHR$ (4);"BSAVE"IM$",A$6000,L"TL",D"DR
4230 DR = 1: RETURN
5000  HOME :DR = 1: GOSUB 6000: GOSUB 6010: GOSUB 600
    0: VTAB 3: HTAB 6: PRINT "LOGOMAKER TABLE CREATI
    ON MENU"
5010  VTAB 7: HTAB 8: PRINT "1 - GET IMAGE": HTAB 8: PRINT
    "2 - SCAN SHAPES": HTAB 8: PRINT "3 - LOAD GRAPH
    IC IMAGES": HTAB 8: PRINT "4 - SAVE GRAPHIC TABL
    ES": HTAB 8: PRINT "5 - QUIT"
5020  GET A$: PRINT
5030  IF A$ = "1" THEN  GOSUB 100
5040  IF A$ = "2" THEN  GOSUB 1000
5050  IF A$ = "3" THEN  GOSUB 4000
5060  IF A$ = "4" THEN  GOSUB 4200
5070  IF A$ = "5" THEN  HOME : END
5090  GOTO 5000
6000  FOR N = 1 TO 40: PRINT ";: NEXT N: RETURN
6010  FOR L = 1 TO 3: PRINT ";: FOR N = 1 TO 38: PRINT
    " ";: NEXT N: PRINT ";: NEXT L: RETURN
7000  VTAB 20: HTAB 1: PRINT "INPUT <C>-<RETURN> FOR
    CATALOG": PRINT "INPUT <D>-<RETURN> TO CHANGE DR
    IVE": RETURN
7100  POKE 788,56: CALL 768: RETURN
7200  POKE 788,24: CALL 768: RETURN
7300 DR = ((DR = 1) * 2) + ((DR = 2) * 1): RETURN
```

LISTING 2

```
 1 ********************************
 2 *                              *
 3 *        MOVE.DHRSCREENS       *
 4 *           UTILITY            *
 5 *                              *
 6 *             BY               *
 7 *         SCOTT ANTHONY        *
 8 *                              *
 9 *     COPYRIGHT (C) 1985       *
10 *     S. ANTHONY STUDIOS       *
11 *                              *
12 ********************************
13 *
14 * ASSEMBLED WITH MERLIN
15 * SEPT 17 1985
16 *
17 *  MUST POKE 56 (SEC) OR 24 (CLC) IN
        LOC (788) FROM BASIC
18 *  TO DEFINE DIRECTION OF MOVE
19 *
20   ORG $300
21 *
22 START LDA #$00
23   STA $3C ;LOW BYTE SOURCE START
24   STA $42 ;LOW BYTE DESTINATION START
25   LDA #$20
26   STA $3D ;HIGH BYTE SOURCE START
27   STA $43 ;HIGH BYTE DESTINATION START
28   LDA #$3F
29   STA $3F ;HIGH BYTE SOURCE END
30   LDA #$FF
31   STA $3E ;LOW BYTE SOURCE END
32 LOC NOP   ;POKE CLC OR SEC FROM BASIC
33   JSR $C311 ;AUXMOVE
34   RTS
35 *
```

LISTING 3

```
                        1  ********************************
                        2  *                              *
                        3  *        DHR.LOGOMAKER         *
                        4  *                              *
                        5  *             BY               *
                        6  *         SCOTT ANTHONY        *
                        7  *                              *
                        8  *     COPYRIGHT (C) 1985       *
                        9  *     S. ANTHONY STUDIOS       *
                       10  *                              *
                       11  ********************************
                       12  *
                       13  * PROGRAM ASSEMBLED WITH MERLIN
                       14  * SEPT 16 1985
                       15  *
                       16  TABL     EQU  $05
                       17  BWD      EQU  $07          ;WIDTH OF BLOCK IN BYTES
                       18  HT       EQU  $08          ;HT OF BLOCK IN LINES
                       19  HPOSN    EQU  $F411
                       20  HBASL    EQU  $26
                       21  HBASH    EQU  $27
                       22  *
                       23  * SOFTSWITCHES
                       24  *
                       25  AN3ON    EQU  $C05F
                       26  AN3OFF   EQU  $C05E
                       27  COL80ON  EQU  $C00D
                       28  COL80OFF EQU  $C00C
                       29  GRAPHICS EQU  $C050
                       30  TEXT     EQU  $C051
                       31  HIRES    EQU  $C057
                       32  LOWRES   EQU  $C056
                       33  STORE80  EQU  $C001
                       34  STORE80OFF EQU $C000
                       35  PAGE1    EQU  $C054
                       36  PAGE2OFF EQU  $C054
                       37  PAGE2    EQU  $C055
                       38  PAGE1X   EQU  $C055
                       39  *
                       40  ********************************
                       41  *                              *
                       42  *        MAIN PROGRAM          *
                       43  *                              *
                       44  ********************************
                       45  *
                       46            ORG  $8000        ;LOADS & EXECUTES AT 32768 DECIMAL
                       47  *
8000: 4C 24 80         48            JMP  INIT
                       49  *
                       50  * DEFINE STORAGE
                       51  *
                       52  XL       DS   2            ;LEFT SIDE OF BLOCK (32771, $8003)
                       53  XR       DS   2            ;RIGHT SIDE OF BLOCK (32773, $8005

                       54  YT       DS   1            ;TOP OF BLOCK (32775, $8007)
                       55  YB       DS   1            ;BOTTOM OF BLOCK (32776, $8008)
                       56  YCTR     DS   1            ;Y VALUE COUNTER (32777, $8009)
                       57  BYTE     DS   1            ;# OF BYTE ALONG LINE
                       58  B2       DS   1            ;
                       59  COLL     DS   1            ;VALUE OF DHR LEFTHAND BYTE
                       60  COLR     DS   1            ;VALUE OF DHR RIGHTHAND BYTE
                       61  LNCT     DS   1            ;LINE COUNTER FOR TRANSFORMING COL
UMNS
                       62  LOOPCTR  DS   1            ;LOOP COUNTER
                       63  DVDN     DS   2            ;DIVIDEND FOR DIV16 ROUTINE (HIGH
BYTE FIRST)
                       64  DVSR     DS   1            ;DIVISOR
                       65  RMNDR    DS   1            ;REMAINDER
                       66  TEMPS    DS   8            ;HOLDS BYTES FROM SCREEN
                       67  TEMPS1   DS   8            ;HOLDS TRANSFORMED BYTES
                       68  *
                       69  ********************************
                       70  *                              *
                       71  *   INITIALIZATION & ENTRY     *
                       72  *                              *
                       73  ********************************
                       74  *
8024: A9 00            75  INIT     LDA  #$00         ;SET LINE CTR=0
8026: 8D 0E 80         76            STA  LNCT
8029: 85 05            77            STA  TABL         ;INIT LOW BYTE OF TABLE POINTER
802B: A9 60            78            LDA  #$60         ;INIT HIGH BYTE OF TABLE POINTER
802D: 85 06            79            STA  TABL+1
802F: AD 07 80         80            LDA  YT           ;GET TOP OF BLOCK
8032: 8D 09 80         81            STA  YCTR         ;INITIALIZE Y COUNTER
8035: 20 5B 81         82            JSR  WDCALC       ;CALCULATE WIDTH OF SCREEN BLOCK
8038: 20 9B 81         83            JSR  HTCALC       ;CALCULATE HEIGHT OF SCREEEN BLOCK
803B: AD 0C 80         84            LDA  COLL         ;GET VALUE OF LEFTMOST COLUMN
803E: 8D 0A 80         85            STA  BYTE         ;INITIALZE HORIZONTAL OFFSET
                       86  *
                       87  ********************************
                       88  *
8041: 20 C0 81         89  ROWLOOP  JSR  INITDHR     ;TURN ON DOUBLE HIGH RES
8044: 20 D1 80         90            JSR  GETTEMPS     ;GET BYTES FROM SCREEN
8047: 20 D0 81         91            JSR  KILLDHR      ;TURN OFF DOUBLE HIGH RES
804A: 20 82 80         92            JSR  TRTEMPS      ;TRANSFORM SCREEN BYTES
804D: 20 35 81         93            JSR  POKTABL      ;PUT THEM IN TABLE
8050: AD 0A 80         94            LDA  BYTE         ;GET VALUE OF BYTE
8053: CD 0D 80         95            CMP  COLR         ;> RIGHT MARGIN?
8056: B0 06            96            BCS  ENDROW       ;YES, MARK END OF ROW
8058: EE 0A 80         97            INC  BYTE         ;NO, POINT TO NEXT
805B: 18               98            CLC
805C: 90 E3            99            BCC  ROWLOOP      ;BRANCH ALWAYS
                      100  *
                      101  ********************************
                      102  *
805E: 20 4C 81        103  ENDROW   JSR  MARKTABL     ;PUT MARKER AT END OF EACH LINE
8061: AD 09 80        104            LDA  YCTR         ;GET VERTICAL VALUE
8064: CD 08 80        105            CMP  YB           ;BOTTOM?
8067: B0 0F           106            BCS  DONEBL       ;YES, THEN TIDY UP
8069: 18              107            CLC
806A: 69 07           108            ADC  #$07         ;NO, THEN BUMP COUNTER
806C: 8D 09 80        109            STA  YCTR
806F: AD 0C 80        110            LDA  COLL         ;GET VALUE OF LEFT COL
8072: 8D 0A 80        111            STA  BYTE         ;RESET TO BEGINNING OF BLOCK
8075: 18              112            CLC
8076: 90 C9           113            BCC  ROWLOOP      ;BRANCH ALWAYS
                      114  *
                      115  ********************************
                      116  *
8078: 20 4C 81        117  DONEBL   JSR  MARKTABL
807B: 20 4C 81        118            JSR  MARKTABL     ;PUT 2 FF'S AT END OF TABLE
807E: 20 D0 81        119            JSR  KILLDHR
8081: 60              120            RTS
                      121  *
```

Continued

What every Apple II+ and IIe user should ask before buying the "Sider" 10 MB hard disk:

When a company offers a superior quality 10 megabyte Winchester hard disk for only $695, it's bound to raise a few eyebrows... and a lot of questions. The fact is, you're probably already wondering "Can I really get a 10 megabyte hard disk that's *reliable* for only $695?" The answer is: ABSOLUTELY...when you choose the Sider from First Class Peripherals.

What's so great about the Sider?

For starters, the Sider lets you boot your ***Apple II+*** or ***IIe*** directly off the hard disk—unlike some other Winchester subsystems. Rebooting is also trouble-free. And the disk is partitionable, allowing you to allocate space to four operating systems on the same disk. The Sider supports: Apple DOS 3.3; Pro DOS™; Apple Pascal; and CP/M®

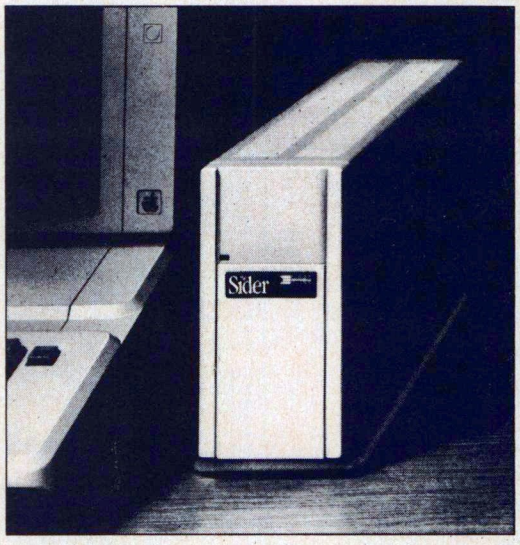
What's more, a small "footprint" lets you incorporate the compact Sider into your existing computer set-up with ease.

In addition, with the Sider, you not only pay far less for the subsystem, you also save money on installation. Because, unlike other 10 MB systems that require the purchase of expensive "extras," the Sider is *plug and play*. Everything you need is provided, including cables, host adaptor, installation software and manual.

What makes it so reliable?

To start, the Sider is manufactured, and sold exclusively, by First Class Peripherals, an innovative computer company which is backed by Xebec. The computer industry's leading manufacturer of disk controllers, Xebec has over a decade of experience serving customers like IBM, Toshiba, Texas Instruments and Hewlett Packard. It's this kind of expertise that helps assure the Sider's performance.

Special design features further enhance reliability. The Sider's controller is the field-proven, industry standard Xebec S1410A. And Xebec's 3200 drive tester, the toughest in the industry, ensures that the Sider will operate reliably. One more assurance of the $695 Sider's quality: it's UL Approved and FCC Class B rated.



"Only $695"

But why is it only $695?

You pay less for the Sider than for other 10 MB hard disks simply because you're paying for the superior quality components inside the unit, not for a lot of retail overhead costs. Since First Class Peripherals sells direct, you avoid dealer and distribution expenses, and pay only for the product.

What about a guarantee?

Like many experienced Apple users, you may be reluctant to buy a hard disk priced at only $695 without first seeing for yourself how it performs. That's why First Class Peripherals offers you a reassuring, money-back guarantee that eliminates any risk on your part. Simply order the Sider and use it for 15 days. Then, if you're not entirely satisfied, return it and receive a full refund—no questions asked.

The Sider also comes with a full one-year limited warranty. Plus, there's a convenient, toll-free hotline you can call anytime you have a technical or service question, or need help.

Don't delay. Order the Sider now.

To receive the Sider 10 megabyte Winchester hard disk subsystem for only $695, simply order using the coupon below. For faster service, order by phone and charge to your VISA, MasterCard or American Express. (You can also call us if you have any questions or technical concerns about the Sider. We'll see you get the help you need.) Call toll-free:

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Extension 202
1-800-227-7792 *Canada*

☐ Yes, please send me the Sider, including half-height 10 megabyte Winchester hard disk drive, Apple adaptor board, cable, complete installation software and documentation.

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CIRCLE 20 READER SERVICE CARD

```
                        122 ***********************************
                        123 *
                        124 *
                        125 ***********************************
                        126 *
8082: A2 00             127 TRTEMPS  LDX  #$00        ;INITIALIZE FIRST COUNTER
8084: A0 00             128          LDY  #$00        ;INITIALIZE SECOND COUNTER
8086: A9 07             129          LDA  #$07        ;DO SAME WITH A THIRD COUNTER
8088: 8D 0F 80          130          STA  LOOPCTR
808B: 18                131 TRANS    CLC
808C: 5E 14 80          132          LSR  TEMPS,X     ;SHIFT LOW BIT INTO CARRY
808F: 8A                133          TXA              ;SAVE X FOR A BIT
8090: 48                134          PHA
8091: 98                135          TYA              ;SAVE Y FOR A BIT
8092: AA                136          TAX              ;PUT Y INTO X
8093: 3E 1C 80          137          ROL  TEMPS1,X    ;PUT CARRY INTO LOW BIT
8096: 68                138          PLA              ;GET BACK ORIGINAL X
8097: AA                139          TAX
8098: E8                140          INX
8099: E0 07             141          CPX  #$07        ;DONE 7 TIMES?
809B: D0 EE             142          BNE  TRANS       ;NO, THEN DO IT AGAIN
809D: A2 00             143          LDX  #0          ;YES, THEN RESET X
809F: C8                144          INY              ;AND BUMP SECOND COUNTER
80A0: CE 0F 80          145          DEC  LOOPCTR     ;DONE WITH ALL LOOPS?
80A3: D0 E6             146          BNE  TRANS       ;NO, THEN LOOP AGAIN?
80A5: 60                147          RTS              ;YES, THEN RETURN
                        148
                        149 ***********************************
                        150 *
80A6: A9 00             151 DIV16    LDA  #0          ;CLEAR REMAINDER
80A8: 8D 13 80          152          STA  RMNDR
80AB: A2 11             153          LDX  #17         ;SETUP COUNTER (1 MORE THAN # OF B
                             ITS)
80AD: 4C B9 80          154          JMP  DIV         ;JUMP TO START OF DIVIDE
80B0: AD 13 80          155 DIVLOOP  LDA  RMNDR       ;GET CURRENT REMAINDER
80B3: 38                156          SEC              ;SET CARRY
80B4: ED 12 80          157          SBC  DVSR        ;SUBTRACT DIVISOR
80B7: 10 04             158          BPL  NREST       ;GO IF NO RESTORE
80B9: 18                159 DIV      CLC              ;QUOTIENT=0
80BA: 4C C1 80          160          JMP  MERGQ       ;GO TO SET Q
80BD: 8D 13 80          161 NREST    STA  RMNDR       ;NEW REMAINDER
80C0: 38                162          SEC
80C1: 2E 11 80          163 MERGQ    ROL  DVDN+1      ;LOW BYTE
80C4: 2E 10 80          164          ROL  DVDN        ;HI BYTE
80C7: CA                165          DEX              ;DECREMENT COUNTER
80C8: F0 06             166          BEQ  DIVRTN      ;RETURN IF DONE
80CA: 2E 13 80          167          ROL  RMNDR       ;ROLL LEFT
80CD: 4C B0 80          168          JMP  DIVLOOP     ;CONTINUE
80D0: 60                169 DIVRTN   RTS
                        170 *
                        171 *
                        172 ***********************************
                        173 *
80D1: A9 00             174 GETTEMPS LDA  #0          ;INITIALIZE LINE COUNTER
80D3: 8D 0E 80          175          STA  LNCT
80D6: AD 0A 80          176          LDA  BYTE        ;GET HORIZONTAL OFFSET
80D9: 4A                177          LSR              ;EVEN OR ODD?
80DA: 8D 0B 80          178          STA  B2          ;STORE IT WHATEVER
80DD: B0 2E             179          BCS  GT1         ;ODD, SO BYTES MUST COME FROM MAIN
                        180                           ;MEMORY
80DF: AD 09 80          181 GT1X     LDA  YCTR        ;EVEN, SO GET BYTES FROM AUX MEMOR
                             Y
80E2: 18                182          CLC
80E3: 6D 0E 80          183          ADC  LNCT        ;GET LINE NUMBER
80E6: AA                184          TAX              ;PUT IT IN X AS OFFSET
80E7: BD F6 81          185          LDA  YTABLL,X    ;FIND BASE ADDRESS OF LINE
80EA: 85 26             186          STA  HBASL       ;     FROM TABLE
80EC: BD B6 82          187          LDA  YTABLH,X
80EF: 85 27             188          STA  HBASH
80F1: AC 0B 80          189          LDY  B2          ;GET HORIZONTAL OFFSET
80F4: AE 0E 80          190          LDX  LNCT        ;AND LINE COUNTER
80F7: 8D 55 C0          191          STA  PAGE2       ;READ AUX MEMORY
80FA: B1 26             192          LDA  (HBASL),Y   ;GET BYTE FROM SCREEN
80FC: 8D 54 C0          193          STA  PAGE2OFF    ;TURN OFF AUX MEMORY READ
80FF: 9D 14 80          194          STA  TEMPS,X     ;STORE BYTE
8102: EE 0E 80          195          INC  LNCT        ;BUMP LINE COUNTER
8105: AD 0E 80          196          LDA  LNCT        ;DONE?
8108: C9 08             197          CMP  #8
810A: D0 D3             198          BNE  GT1X        ;NO, SO ONCE AGAIN
810C: 60                199          RTS              ;YES, SO RETURN
                        200 *
810D: AD 09 80          201 GT1      LDA  YCTR        ;SAME AS FOR AUX MEMORY ABOVE
8110: 18                202          CLC              ;EXCEPT READ MAIN MEMORY INSTEAD
8111: 6D 0E 80          203          ADC  LNCT        ;GET LINE NUMBER
8114: AA                204          TAX
8115: BD F6 81          205          LDA  YTABLL,X
8118: 85 26             206          STA  HBASL
811A: BD B6 82          207          LDA  YTABLH,X
811D: 85 27             208          STA  HBASH
811F: AC 0B 80          209          LDY  B2          ;   OF LINE IN HBASL, HBASH
8122: AE 0E 80          210          LDX  LNCT
8125: B1 26             211          LDA  (HBASL),Y   ;GET BYTE FROM SCREEN
8127: 9D 14 80          212          STA  TEMPS,X
812A: EE 0E 80          213          INC  LNCT
812D: AD 0E 80          214          LDA  LNCT
8130: C9 08             215          CMP  #8
8132: D0 D9             216          BNE  GT1
8134: 60                217          RTS
                        218 *
                        219 ***********************************
                        220 *
8135: A2 00             221 POKTABL  LDX  #$00        ;INIT COUNTER
8137: A0 00             222 POKTABL2 LDY  #0          ;GET VALUE OF TABLE POINTER
8139: BD 1C 80          223          LDA  TEMPS1,X    ;GET TRANSFORMED BYTE
813C: 29 7F             224          AND  #$7F        ;CLEAR HIGH BIT
813E: 91 05             225          STA  (TABL),Y    ;STORE IT IN TABLE
8140: E6 05             226          INC  TABL        ;BUMP TABLE POINTER
8142: D0 02             227          BNE  AGAIN       ;IF NO WRAP AROUND, THEN SKIP NEXT
8144: E6 06             228          INC  TABL+1
8146: E8                229 AGAIN    INX              ;INCREMENT COUNTER
8147: E0 07             230          CPX  #$07        ;DONE 7 TIMES?
8149: D0 EC             231          BNE  POKTABL2    ;NO, THEN LOOP
814B: 60                232 RETURN   RTS              ;YES, THEN RETURN
                        233 *
                        234 ***********************************
                        235 *
814C: A9 FF             236 MARKTABL LDA  #$FF        ;VALUE USED AS END MARKER
814E: A0 00             237          LDY  #0
8150: 91 05             238          STA  (TABL),Y    ;STORE AT PRESENT TABLE POINTER LO
                             CATION
8152: E6 05             239          INC  TABL        ;BUMP TABLE POINTER LOW BYTE
8154: D0 F5             240          BNE  RETURN
8156: E6 06             241          INC  TABL+1
8158: 18                242          CLC
8159: 90 F0             243          BCC  RETURN
                        244 *
815B: AD 05 80          245 WDCALC   LDA  XR          ;SET UP FOR DIVIDE
815E: 8D 10 80          246          STA  DVDN        ;HI BYTE OF DIVIDEND
8161: AD 06 80          247          LDA  XR+1
8164: 8D 11 80          248          STA  DVDN+1      ;LOW BYTE OF DIVIDEND
8167: A9 07             249          LDA  #7          ;DIVISOR
8169: 8D 12 80          250          STA  DVSR        ;DIVISOR
816C: 20 A6 80          251          JSR  DIV16
816F: AD 11 80          252          LDA  DVDN+1
8172: 8D 0D 80          253          STA  COLR        ;STORE BYTE VALUE OF RIGHT COL
8175: AD 03 80          254          LDA  XL          ;SET UP FOR DIVIDE AGAIN
8178: 8D 10 80          255          STA  DVDN        ;HIGH BYTE
817B: AD 04 80          256          LDA  XL+1
817E: 8D 11 80          257          STA  DVDN+1
8181: A9 07             258          LDA  #7
8183: 8D 12 80          259          STA  DVSR
8186: 20 A6 80          260          JSR  DIV16
8189: AD 11 80          261          LDA  DVDN+1      ;GET QUOTIENT
818C: 8D 0C 80          262          STA  COLL
818F: AD 0D 80          263          LDA  COLR
8192: 38                264          SEC
8193: ED 0C 80          265          SBC  COLL
8196: 85 07             266          STA  BWD         ;STORE BYTE WIDTH
8198: E6 07             267          INC  BWD         ;INCREMENT IT TO INCLUDE BOTH END
                             BYTES
819A: 60                268          RTS
                        269 *
819B: AD 08 80          270 HTCALC   LDA  YB          ;GET BOTTOM LINE
819E: 38                271          SEC              ;PREPARE TO SUBTRACT
819F: ED 07 80          272          SBC  YT
81A2: 85 08             273          STA  HT
81A4: 60                274          RTS
                        275 *
                        276 BLANK    EQU  *
                        277          DS   $81C0-BLANK
                        278 *
81C0: 8D 5E C0          279 INITDHR  STA  AN3OFF      ;DEC ADDRESS 33216
81C3: 8D 0D C0          280          STA  COL80ON
81C6: 8D 01 C0          281          STA  STORE80
81C9: 8D 50 C0          282          STA  GRAPHICS
81CC: 8D 57 C0          283          STA  HIRES
81CF: 60                284          RTS
                        285 *
81D0: 8D 5F C0          286 KILLDHR  STA  AN3ON       ;DEC ADDRESS 33232
81D3: 8D 0C C0          287          STA  COL80OFF
81D6: 8D 51 C0          288          STA  TEXT
81D9: 8D 56 C0          289          STA  LOWRES
81DC: 8D 00 C0          290          STA  STORE80OFF
81DF: 8D 54 C0          291          STA  PAGE1
81E2: 60                292          RTS
                        293 *
81E3: 8D 5F C0          294 SHOW2    STA  AN3ON       ;DEC ADDRESS 33251
81E6: 8D 0C C0          295          STA  COL80OFF
81E9: 8D 00 C0          296          STA  STORE80OFF
81EC: 8D 50 C0          297          STA  GRAPHICS
81EF: 8D 57 C0          298          STA  HIRES
81F2: 8D 55 C0          299          STA  PAGE2
81F5: 60                300          RTS
                        301 *
                        302 *
                        303 ***********************************
                        304 * HIRES SCREEN ADDRESSES
                        305 ***********************************
                        306 *
81F6: 00 00 00          307 YTABLL   DFB  $00,$00,$00,$00,$00,$00,$00,$00
81F9: 00 00 00 00 00
81FE: 80 80 80          308          DFB  $80,$80,$80,$80,$80,$80,$80,$80
8201: 80 80 80 80 80
8206: 00 00 00          309          DFB  $00,$00,$00,$00,$00,$00,$00,$00
8209: 00 00 00 00 00
820E: 80 80 80          310          DFB  $80,$80,$80,$80,$80,$80,$80,$80
8211: 80 80 80 80 80
8216: 00 00 00          311          DFB  $00,$00,$00,$00,$00,$00,$00,$00
8219: 00 00 00 00 00
821E: 80 80 80          312          DFB  $80,$80,$80,$80,$80,$80,$80,$80
8221: 80 80 80 80 80
8226: 00 00 00          313          DFB  $00,$00,$00,$00,$00,$00,$00,$00
8229: 00 00 00 00 00
822E: 80 80 80          314          DFB  $80,$80,$80,$80,$80,$80,$80,$80
8231: 80 80 80 80 80
8236: 28 28 28          315          DFB  $28,$28,$28,$28,$28,$28,$28,$28
8239: 28 28 28 28 28
823E: A8 A8 A8          316          DFB  $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
8241: A8 A8 A8 A8 A8
8246: 28 28 28          317          DFB  $28,$28,$28,$28,$28,$28,$28,$28
8249: 28 28 28 28 28
824E: A8 A8 A8          318          DFB  $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
8251: A8 A8 A8 A8 A8
8256: 28 28 28          319          DFB  $28,$28,$28,$28,$28,$28,$28,$28
8259: 28 28 28 28 28
825E: A8 A8 A8          320          DFB  $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
8261: A8 A8 A8 A8 A8
8266: 28 28 28          321          DFB  $28,$28,$28,$28,$28,$28,$28,$28
8269: 28 28 28 28 28
826E: A8 A8 A8          322          DFB  $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
8271: A8 A8 A8 A8 A8
8276: 50 50 50          323          DFB  $50,$50,$50,$50,$50,$50,$50,$50
8279: 50 50 50 50 50
827E: D0 D0 D0          324          DFB  $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
82B1: D0 D0 D0 D0 D0
82B6: 50 50 50          325          DFB  $50,$50,$50,$50,$50,$50,$50,$50
8289: 50 50 50 50 50
828E: D0 D0 D0          326          DFB  $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
8291: D0 D0 D0 D0 D0
8296: 50 50 50          327          DFB  $50,$50,$50,$50,$50,$50,$50,$50
8299: 50 50 50 50 50
829E: D0 D0 D0          328          DFB  $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
82A1: D0 D0 D0 D0 D0
82A6: 50 50 50          329          DFB  $50,$50,$50,$50,$50,$50,$50,$50
82A9: 50 50 50 50 50
82AE: D0 D0 D0          330          DFB  $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
82B1: D0 D0 D0 D0 D0
                        331 *
82B6: 20 24 28          332 YTABLH   DFB  $20,$24,$28,$2C,$30,$34,$38,$3C
82B9: 2C 30 34 38 3C
82BE: 20 24 28          333          DFB  $20,$24,$28,$2C,$30,$34,$38,$3C
82C1: 2C 30 34 38 3C
82C6: 21 25 29          334          DFB  $21,$25,$29,$2D,$31,$35,$39,$3D
82C9: 2D 31 35 39 3D
82CE: 21 25 29          335          DFB  $21,$25,$29,$2D,$31,$35,$39,$3D
82D1: 2D 31 35 39 3D
82D6: 22 26 2A          336          DFB  $22,$26,$2A,$2E,$32,$36,$3A,$3E
82D9: 2E 32 36 3A 3E
82DE: 22 26 2A          337          DFB  $22,$26,$2A,$2E,$32,$36,$3A,$3E
82E1: 2E 32 36 3A 3E
82E6: 23 27 2B          338          DFB  $23,$27,$2B,$2F,$33,$37,$3B,$3F
82E9: 2F 33 37 3B 3F
82EE: 23 27 2B          339          DFB  $23,$27,$2B,$2F,$33,$37,$3B,$3F
82F1: 2F 33 37 3B 3F
82F6: 20 24 28          340          DFB  $20,$24,$28,$2C,$30,$34,$38,$3C
82F9: 2C 30 34 38 3C
82FE: 20 24 28          341          DFB  $20,$24,$28,$2C,$30,$34,$38,$3C
8301: 2C 30 34 38 3C
8306: 21 25 29          342          DFB  $21,$25,$29,$2D,$31,$35,$39,$3D
```

```
8309: 2D 31 35 39 3D
830E: 21 25 29  343          DFB  $21,$25,$29,$2D,$31,$35,$39,$3D
8311: 2D 31 35 39 3D
8316: 22 26 2A  344          DFB  $22,$26,$2A,$2E,$32,$36,$3A,$3E
8319: 2E 32 36 3A 3E
831E: 22 26 2A  345          DFB  $22,$26,$2A,$2E,$32,$36,$3A,$3E
8321: 2E 32 36 3A 3E
8326: 23 27 2B  346          DFB  $23,$27,$2B,$2F,$33,$37,$3B,$3F
8329: 2F 33 37 3B 3F
832E: 23 27 2B  347          DFB  $23,$27,$2B,$2F,$33,$37,$3B,$3F
8331: 2F 33 37 3B 3F
8336: 20 24 28  348          DFB  $20,$24,$28,$2C,$30,$34,$38,$3C
8339: 2C 30 34 38 3C
833E: 20 24 28  349          DFB  $20,$24,$28,$2C,$30,$34,$38,$3C
8341: 2C 30 34 38 3C
8346: 21 25 29  350          DFB  $21,$25,$29,$2D,$31,$35,$39,$3D
8349: 2D 31 35 39 3D
834E: 21 25 29  351          DFB  $21,$25,$29,$2D,$31,$35,$39,$3D
8351: 2D 31 35 39 3D
8356: 22 26 2A  352          DFB  $22,$26,$2A,$2E,$32,$36,$3A,$3E
8359: 2E 32 36 3A 3E
835E: 22 26 2A  353          DFB  $22,$26,$2A,$2E,$32,$36,$3A,$3E
8361: 2E 32 36 3A 3E
8366: 23 27 2B  354          DFB  $23,$27,$2B,$2F,$33,$37,$3B,$3F
8369: 2F 33 37 3B 3F
836E: 23 27 2B  355          DFB  $23,$27,$2B,$2F,$33,$37,$3B,$3F
8371: 2F 33 37 3B 3F
                356  *
                357  *
                358  BUFFER   DS   1          ;BUFFER TO STORE LINE
                359  *
                360  * NOTE    ALLOW 41 BYTES FOR THIS DATA BUFFER.
                361  *         THUS FOR THE NORMAL 48K APPLE WITH DOS,
                362  *         THE BUFFER MUST BE BEFORE $95D8 (38360)

--End assembly--

887 bytes

Errors: 0

Symbol table - alphabetical order:

AGAIN   =$8146      AN3OFF  =$C05E      AN3ON   =$C05F      B2      =$800B
BLANK   =$81A5   ?  BUFFER  =$8376      BWD     =$07        BYTE    =$800A
COL80OFF=$C00C      COL80ON =$C00D      COLL    =$800C      COLR    =$800D
DIV16   =$80B9      DIV16   =$80A6      DIVLOOP =$80BO      DIVRTN  =$80D0
DONEBL  =$8078      DVDN    =$8010      DVSR    =$8012
GRAPHICS=$C050      GT1     =$810D      GT1X    =$80DF
HBASH   =$27        HBASL   =$26        HIRES   =$C057   ?  HP
$819B       INIT    =$8024      INITDHR =$81C0
KILLDHR =$81D0      LNCT    =$800E      LOOPCTR =
C1      NREST   =$80BD      PAGE1   =$C054
?  PAGE1X  =$C055      PAGE2   =$C055      P
```

LISTING 4

```
                1   ********************************
                2   *                              *
                3   *         DHR.LOGOPRINT        *
                4   *                              *
                5   *              BY              *
                6   *        SCOTT ANTHONY         *
                7   *                              *
                8   *     COPYRIGHT (C) 1985       *
                9   *     S. ANTHONY STUDIOS       *
                10  *                              *
                11  ********************************
                12  *
                13  * PROGRAM ASSEMBLED WITH MERLIN ASSEMBLER
                14  * SEPT 16 1985
                15  *
                16  * ZERO PAGE LOCATIONS
                17  *
                18  TWDL     EQU  $06        ;TOTAL WD OF BOTH TABLES LOW BYTE
                19  TWDH     EQU  $07        ;    HI BYTE
                20  SPACESL  EQU  $08        ;SPACES BETWEEN PRINTOUT OF TABLES
                21  SPACESH  EQU  $09
                22  TAB      EQU  $EF        ;VALUE OF TAB (DEC 238)
                23  TABL1    EQU  $EB        ;ADDR OF START TABLE 1 (DEC 235)
                24  TABL2    EQU  $ED        ;ADDR OF START TABLE 2 (DEC 237)
                25  T1       EQU  $FA        ;VERT POSITION OF TOP OF TABLE 1
                26  T2       EQU  $FB        ;    SAME FOR TABLE 2
                27  OFFSET   EQU  $FB        ;USED ALSO AS OFFSET VALUE
                28  T1DONE   EQU  $FC        ;FLAG (IF <> 0 THEN DONE)
                29  T2DONE   EQU  $FD        ;FLAG
                30  *
                31  * OTHER MEMORY REFERENCES
                32  *
                33  PRTRDY   EQU  $C1C1      ;PRINTER ACKNOWLEDGE
                34  PRTOUT   EQU  $C090      ;SLOT 1 PRINTER OUT
                35  *
                36           ORG  $8000      ;LOADS & EXECUTES AT 32768
                37  *
8000: 4C 0A 80  38           JMP  INIT
                39  *
                40  * DEFINE STORAGE
                41  *
                42  WD1L     DS   1          ;LOW BYTE WIDTH TABLE 1
                43  WD1H     DS   1          ;HIGH BYTE
                44  WD2L     DS   1          ;LOW BYTE WIDTH TABLE 2
                45  WD2H     DS   1          ;HIGH BYTE
                46  ANSLO    DS   1
                47  PLIER    DS   1          ;MULTIPLIER
                48  CAND     DS   1          ;MULTIPLICAND
                49  *
                50  ********************************
                51  *                              *
                52  * INITIALIZATION & MAIN LOOP   *
                53  *                              *
                54  ********************************
                55  *
800A: 20 29 81  56  INIT     JSR  WDCALC     ;CALCULATE # DOTS TO PRINT PER LIN
E
800D: A4 07     57           LDY  TWDH       ;GET TOTAL WIDTH HIGH BYTE
800F: A5 06     58           LDA  TWDL       ;    LOW BYTE
8011: 18        59           CLC
8012: 65 08     60           ADC  SPACESL    ;ADD LOW BYTE SPACES
8014: 85 06     61           STA  TWDL       ;LOW BYTE OF TOTAL WIDTH
8016: 8D DB 81  62           STA  GRPRINT+2  ;PUT IT IN PRINTER COMMAND LINE
8019: 90 01     63           BCC  I1         ;IF NO CARRY, SKIP NEXT
801B: C8        64           INY             ;CARRY SET, SO BUMP HI BYTE
801C: 84 07     65  I1       STY  TWDH       ;HIGH BYTE OF TOTAL WIDTH
801E: 8C DC 81  66           STY  GRPRINT+3  ;STORE IT IN PRINTER COMMAND LINE
8021: A9 40     67           LDA  #$40       ;TABLE 1 START, HIGH BYTE
8023: 85 EC     68           STA  TABL1+1
8025: A9 00     69           LDA  #$0        ;TABLE 1 START, LOW BYTE
8027: 85 ED     70           STA  TABL2      ;ALSO TABLE 2
8029: 85 EB     71           STA  TABL1
802B: A9 60     72           LDA  #$60       ;TABLE 2 START, HIGH BYTE
802D: 85 EE     73           STA  TABL2+1
802F: A5 EF     74           LDA  TAB        ;GET LEFT MARGIN
8031: 8D E9 81  75           STA  TABSET+2   ;INTO PRINTER COMMAND LINE
                76  *
8034: A5 FB     77           LDA  T2         ;GET TOP OF TABLE 2
8036: 38        78           SEC
8037: E5 FA     79           SBC  T1         ;SUBTRACT TOP OF TABLE 1
8039: 85 FB     80           STA  OFFSET
803B: A9 00     81           LDA  #$00
803D: 85 FC     82           STA  T1DONE     ;INIT FLAGS
803F: 85 FD     83           STA  T2DONE
                84  *
8041: A9 0D     85           LDA  #$0D       ;<CR> EMPTY BUFFER
8043: 20 97 81  86           JSR  OUTBYTE
8046: A9 17     87           LDA  #TABSET-STRING
8048: 20 82 81  88           JSR  OUTSTR     ;SET LEFT MARGIN
804B: A9 00     89           LDA  #GRSETUP-STRING
804D: 20 82 81  90           JSR  OUTSTR     ;PUT PRINTER IN GRAPHICS MODE
8050: A9 0D     91           LDA  #$0D       ;<CR>
8052: 20 97 81  92           JSR  OUTBYTE
                93  *
8055: A5 FC     94  GO       LDA  T1DONE     ;DONE WITH TABLE 1?
8057: F0 07     95           BEQ  GOO        ;NO, THEN TEST OFFSET
8059: A5 FD     96           LDA  T2DONE     ;DONE WITH TABLE 2?
805B: F0 03     97           BEQ  GOO        ;NO, THEN TEST OFFSET
805D: 4C 23 81  98           JMP  ALLDONE    ;YES, THEN ALL DONE
                99  *
8060: 20 A0 81  100 GOO      JSR  GRLINE     ;SET UP PRINTER
8063: A5 FB     101          LDA  OFFSET
8065: F0 04     102          BEQ  G01        ;IF NO OFFSET, PRINT BOTH TABLES
8067: 30 1F     103          BMI  G02        ;IF OFFSET NEGATIVE THEN T1>T2
8069: 10 2E     104          BPL  G03        ;IF OFFSET POSITIVE THEN T2>T1
                105 *
806B: A5 FC     106 G01      LDA  T1DONE     ;DONE WITH TABLE 1?
806D: F0 03     107          BEQ  G1         ;NO, THEN SKIP NEXT
806F: 20 EC 80  108          JSR  PRSPACE1   ;YES, THEN PRINT SPACES
8072: 20 AA 80  109 G1       JSR  PRTABL     ;PRINT TABLE 1
8075: 20 DC 80  110          JSR  PRSPACE    ;PRINT SPACES BETWEEN TABLES
8078: A5 FD     111          LDA  T2DONE     ;DONE WITH TABLE 2?
807A: F0 03     112          BEQ  G2         ;NO, THEN SKIP NEXT
807C: 20 FE 80  113          JSR  PRSPACE2   ;YES, THEN PRINT SPACES
807F: 20 C3 80  114 G2       JSR  PRTABL2    ;PRINT TABLE 2
8082: 20 10 81  115          JSR  NXTLINE    ;UPDATE FOR NEXT LINE
8085: 4C 55 80  116          JMP  GO         ;LOOP
                117 *
8088: 20 EC 80  118 G02      JSR  PRSPACE1   ;SAME LOGIC AS ABOVE
808B: 20 DC 80  119          JSR  PRSPACE
808E: 20 C3 80  120          JSR  PRTABL2
8091: 20 10 81  121          JSR  NXTLINE
8094: E6 FB     122          INC  OFFSET     ;
8096: 4C 55 80  123          JMP  GO
                124 *
8099: 20 AA 80  125 G03      JSR  PRTABL
809C: 20 DC 80  126          JSR  PRSPACE
809F: 20 FE 80  127          JSR  PRSPACE2
80A2: 20 10 81  128          JSR  NXTLINE
80A5: C6 FB     129          DEC  OFFSET
80A7: 4C 55 80  130          JMP  GO
                131 *
80AA: A0 00     132 PRTABL   LDY  #0          ;DUMMY OFFSET INTO TABLE
80AC: B1 EB     133          LDA  (TABL1),Y  ;GET BYTE FROM TABLE
80AE: 30 0C     134          BMI  PRRTN      ;IF VALUE IN TABLE=#$FF THEN BRANC
H
80B0: 20 AD 81  135          JSR  OUTIT      ;OTHERWISE PRINT IT
80B3: E6 EB     136          INC  TABL1      ;UPDATE POINTER
80B5: D0 F3     137          BNE  PRTABL     ;NO WRAP AROUND
80B7: E6 EC     138          INC  TABL1+1    ;WRAP AROUND, SO BUMP HIGH BYTE
80B9: 4C AA 80  139          JMP  PRTABL
80BC: E6 EB     140 PRRTN    INC  TABL1      ;FOUND "$FF" SO BUMP PAST IT
80BE: D0 02     141          BNE  PRRTN1
80C0: E6 EC     142          INC  TABL1+1    ;WRAP AROUND, SO BUMP HIGH BYTE
80C2: 60        143 PRRTN1   RTS
                144 *
80C3: A0 00     145 PRTABL2  LDY  #0
80C5: B1 ED     146          LDA  (TABL2),Y  ;GET BYTE FROM TABLE 2
80C7: 30 0C     147          BMI  PR2RTN     ;IF VALUE IN TABLE IS #FF THEN BRA
NCH
80C9: 20 AD 81  148          JSR  OUTIT      ;OTHERWISE PRINT IT
80CC: E6 ED     149          INC  TABL2
80CE: D0 F3     150          BNE  PRTABL2
80D0: E6 EE     151          INC  TABL2+1
80D2: 4C C3 80  152          JMP  PRTABL2
80D5: E6 ED     153 PR2RTN   INC  TABL2
80D7: D0 02     154          BNE  PR2RTN1
80D9: E6 EE     155          INC  TABL2+1
80DB: 60        156 PR2RTN1  RTS
                157 *
80DC: A4 08     158 PRSPACE  LDY  SPACESL    ;GET LOW BYTE OF # OF SPACES
80DE: A6 09     159          LDX  SPACESH    ;GET HIGH BYTE
80E0: A9 00     160 PRS      LDA  #0         ;VALUE TO PRINT
80E2: 20 AD 81  161          JSR  OUTIT      ;PRINT IT
80E5: 88        162          DEY             ;DOWN TO ZERO?
80E6: D0 F8     163          BNE  PRS        ;NOT YET
80E8: CA        164          DEX             ;YES, SO DEC HIGH BYTE
80E9: 10 F5     165          BPL  PRS        ;BRANCH IF >= ZERO
80EB: 60        166          RTS
                167 *
80EC: AE 03 80  168 PRSPACE1 LDX  WD1L       ;PRINTS SPACES = WD1
80EF: AC 04 80  169          LDY  WD1H
80F2: A9 00     170 PRS1     LDA  #0
80F4: 20 AD 81  171          JSR  OUTIT
80F7: CA        172          DEX
80F8: D0 F8     173          BNE  PRS1
80FA: 88        174          DEY
80FB: 10 F5     175          BPL  PRS1
80FD: 60        176          RTS
                177 *
80FE: AE 05 80  178 PRSPACE2 LDX  WD2L       ;PRINTS SPACES = WD2
8101: AC 06 80  179          LDY  WD2H
8104: A9 00     180 PRS2     LDA  #0
8106: 20 AD 81  181          JSR  OUTIT
8109: CA        182          DEX
810A: D0 F8     183          BNE  PRS2
810C: 88        184          DEY
810D: 10 F5     185          BPL  PRS2
810F: 60        186          RTS
                187 *
8110: A0 00     188 NXTLINE  LDY  #0         ;DUMMY OFFSET INTO TABLE
8112: B1 ED     189          LDA  (TABL2),Y
8114: C9 FF     190          CMP  #$FF       ;END MARKER?
8116: D0 02     191          BNE  NL1        ;NO, THEN SKIP
8118: 85 FD     192          STA  T2DONE     ;YES, SET FLAG
811A: B1 EB     193 NL1      LDA  (TABL1),Y  ;DO THE SAME FOR TABLE 1
```

```
811C: C9 FF     194           CMP  #$FF        ;END MARKER?
811E: D0 02     195           BNE  NL2         ;NO, THEN SKIP
8120: 85 FC     196           STA  T1DONE      ;YES, SET FLAG
8122: 60        197  NL2      RTS
                198  *
                199  *
                200  *
8123: A9 20     201  ALLDONE  LDA  #CRLF-STRING
8125: 20 82 81  202           JSR  OUTSTR
8128: 60        203           RTS
                204  *
                205  ********************************
                206  *
8129: A9 40     207  WDCALC   LDA  #$40
812B: 85 07     208           STA  TWDH        ;INIT POINTER
812D: A9 00     209           LDA  #$0
812F: 85 06     210           STA  TWDL
8131: A2 00     211           LDX  #0
8133: A0 00     212           LDY  #0
8135: B1 06     213  WDCALC1 LDA  (TWDL),Y    ;LOOP UNTIL #$FF IS FOUND
8137: 30 09     214           BMI  SET1        ;FOUND, SO GET COUNTER VALUES
8139: C8        215           INY              ;NOT FOUND, SO BUMP COUNTERS
813A: D0 F9     216           BNE  WDCALC1
813C: E8        217           INX
813D: E6 07     218           INC  TWDH
813F: 18        219           CLC
8140: 90 F3     220           BCC  WDCALC1
8142: 8E 04 80  221  SET1     STX  WD1H        ;HIGH BYTE
8145: 8C 03 80  222  S1       STY  WD1L        ;LOW BYTE
8148: A9 60     223           LDA  #$60        ;INIT POINTER TABLE 2
814A: 85 07     224           STA  TWDH
814C: A9 00     225           LDA  #$0
814E: 85 06     226           STA  TWDL
8150: A2 00     227           LDX  #0
8152: A0 00     228           LDY  #0
8154: B1 06     229  WDCALC2 LDA  (TWDL),Y    ;LOOP AGAIN FOR TABLE 2
8156: 30 09     230           BMI  SET2
8158: C8        231           INY
8159: D0 F9     232           BNE  WDCALC2
815B: E8        233           INX
815C: E6 07     234           INC  TWDH
815E: 18        235           CLC
815F: 90 F3     236           BCC  WDCALC2
8161: 8E 06 80  237  SET2     STX  WD2H
8164: 8C 05 80  238  S2       STY  WD2L
8167: 18        239  ADDWD    CLC              ;PREPARE TO ADD
8168: AD 03 80  240           LDA  WD1L        ;GET LOW BYTE WD TABLE 1
816B: 6D 05 80  241           ADC  WD2L        ;ADD LOW BYTE WD TABLE 2
816E: 85 06     242           STA  TWDL        ;STORE IT
8170: 90 03     243           BCC  ADDWD1      ;NO CARRY SO SKIP NEXT
8172: EE 06 80  244           INC  WD2H        ;CARRY, SO BUMP HIGH BYTE OF
                245  *                        ;ONE OF TABLES
8175: 18        246  ADDWD1   CLC
8176: AD 04 80  247           LDA  WD1H        ;GET HIGH BYTE WD TABLE 1
8179: 6D 06 80  248           ADC  WD2H        ;ADD HIGH BYTE WD TABLE 2
817C: 18        249           CLC
817D: 65 09     250           ADC  SPACESH     ;ADD HIGH BYTE SPACES
817F: 85 07     251           STA  TWDH
8181: 60        252           RTS
                253  *
                254  ********************************
                255  *
                256  * OUTPUT ROUTINES
                257  *
                258  ********************************
                259  *
8182: 8C F4 81  260  OUTSTR   STY  TMP         ;SAVE Y TEMPORARILY
8185: A8        261           TAY              ;PUT A INTO Y AS COUNTER
8186: B9 D0 81  262  MO       LDA  STRING,Y    ;OFFSET INTO PRINTER COMMANDS
8189: C9 FF     263           CMP  #$FF        ;END MARKER?
818B: F0 06     264           BEQ  M1          ;YES, SO BRANCH
818D: 20 97 81  265           JSR  OUTBYTE     ;NO, SO SEND IT OUT
8190: C8        266           INY              ;UPDATE COUNTER
8191: D0 F3     267           BNE  MO          ;
8193: AC F4 81  268  M1       LDY  TMP         ;GET BACK Y
8196: 60        269           RTS
                270  *
8197: 8D 90 C0  271  OUTBYTE  STA  PRTOUT
819A: 2C C1 C1  272  PB1      BIT  PRTRDY
819D: 30 FB     273           BMI  PB1
819F: 60        274           RTS
                275  *
                276  ********************************
                277  *
                278  * SENDS PRINTER COMMANDS FOR EACH
                279  * LINE OF GRAPHICS SENT OUT
                280  *
                281  ********************************
                282  *
81A0: A9 20     283  GRLINE   LDA  #CRLF-STRING
81A2: 20 82 81  284           JSR  OUTSTR
81A5: A9 09     285           LDA  #GRPRINT-STRING
81A7: 20 82 81  286           JSR  OUTSTR
81AA: A2 00     287           LDX  #0
81AC: 60        288           RTS
                289  *
81AD: 20 97 81  290  OUTIT    JSR  OUTBYTE
81B0: 60        291           RTS
                292  *
                293  ********************************
                294  *
81B1: 8D 08 80  295  MULT8    STA  PLIER       ;SAVE MULTIPLIER
81B4: 8C 09 80  296           STY  CAND        ;SAVE MULTIPLIER
81B7: A9 00     297           LDA  #$00        ;INIT ANSWER
81B9: A0 08     298           LDY  #$08        ;INIT BIT COUNTER
81BB: 4E 08 80  299  MUL1     LSR  PLIER       ;SHIFT LOW BIT OUT OF MULTIPLIER
81BE: 90 04     300           BCC  MUL2        ;IF BIT = 0 THEN ROUND OFF
81C0: 18        301           CLC
81C1: 6D 09 80  302           ADC  CAND        ;IF BIT = 1 THEN ADD TO MULTIPLICA
ND
81C4: 6A        303  MUL2     ROR              ;ROTATE ANSWER ONE BIT
81C5: 6E 07 80  304           ROR  ANSLO
81C8: 88        305           DEY              ;NEXT BIT
81C9: D0 F0     306           BNE  MUL1        ;IF NOT DONE 8 TIMES THEN AGAIN
81CB: A8        307           TAY              ;Y=HI BYTE OF ANS
81CC: AD 07 80  308           LDA  ANSLO       ;A=LO BYTE OF ANS
81CF: 60        309           RTS
                310  *
                311  ************************************************
                312  *
                313  STRING   EQU  *
81D0: 1B 41 07  314  GRSETUP  DFB  $1B,$41,$07,$1B,$4F,$1B,$3D,$0D,$FF
81D3: 1B 4F 1B 3D 0D FF
81D9: 1B 4C 00  315  GRPRINT  DFB  $1B,$4C,0,0,$FF
81DC: 00 FF
81DE: 1B 32 0D  316  TEXTSET  DFB  $1B,$32,$0D,$1B,$4E,$06,$0D,$0C,$FF
81E1: 1B 4E 06 0D 0C FF
81E7: 1B 4D 02  317  TABSET   DFB  $1B,$4D,2,$0D,$FF
81EA: 0D FF
81EC: 1B 40 0D  318  RESET    DFB  $1B,$40,$0D,$FF
81EF: FF
81F0: 0D 0A 09  319  CRLF     DFB  $0D,$0A,9,$FF
81F3: FF
                320  *
                321  *
                322  TMP      DS   1
                323  *

--End assembly--

501 bytes

Errors: 0

Symbol table - alphabetical order:

 ? ADDWD   =$8167    ADDWD1  =$8175    ALLDONE =$8123    ANSLO   =$8007
   CAND    =$8009    CRLF    =$81F0    G1      =$8072    G2      =$807F
   GO      =$8055    GOO     =$8060    GO1     =$806B    GO2     =$8088
   GO3     =$8099    GRLINE  =$81A0    GRPRINT =$81D9    GRSETUP =$81D0
   I1      =$801C    INIT    =$800A    MO      =$8186    M1      =$8193
   MUL1    =$81BB    MUL2    =$81C4  ? MULT8   =$81B1    NL1     =$811A
   NL2     =$8122    NXTLINE =$8110    OFFSET  =$FB      OUTBYTE =$8197
   OUTIT   =$81AD    OUTSTR  =$8182    PB1     =$819A    PLIER   =$8008
   PR2RTN  =$80D5    PR2RTN1 =$80DB    PRRTN   =$80BC    PRRTN1  =$80C2
   PRS     =$80E0    PRS1    =$80F2    PRS2    =$8104    PRSPACE =$80DC
   PRSPACE1=$80EC    PRSPACE2=$80FE    PRTABL  =$80AA    PRTABL2 =$80C3
   PRTOUT  =$C090    PRTRDY  =$C1C1  ? RESET   =$81EC  ? S1      =$8145
 ? S2      =$8164    SET1    =$8142    SET2    =$8161    SPACESH =$09
   SPACESL =$08      STRING  =$81D0    T1      =$FA      T1DONE  =$FC
   T2      =$FB      T2DONE  =$FD      TAB     =$EF      TABL1   =$EB
   TABL2   =$ED      TABSET  =$81E7  ? TEXTSET =$81DE    TMP     =$81F4
   TWDH    =$07      TWDL    =$06      WD1H    =$8004    WD1L    =$8003
   WD2H    =$8006    WD2L    =$8005    WDCALC  =$8129    WDCALC1 =$8135
   WDCALC2 =$8154

Symbol table - numerical order:

   TWDL    =$06      TWDH    =$07      SPACESL =$08      SPACESH =$09
   TABL1   =$EB      TABL2   =$ED      TAB     =$EF      T1      =$FA
   T2      =$FB      OFFSET  =$FB      T1DONE  =$FC      T2DONE  =$FD
   WD1L    =$8003    WD1H    =$8004    WD2L    =$8005    WD2H    =$8006
   ANSLO   =$8007    PLIER   =$8008    CAND    =$8009    INIT    =$800A
   I1      =$801C    GO      =$8055    GOO     =$8060    GO1     =$806B
   G1      =$8072    G2      =$807F    GO2     =$8088    GO3     =$8099
   PRTABL  =$80AA    PRRTN   =$80BC    PRRTN1  =$80C2    PRTABL2 =$80C3
   PR2RTN  =$80D5    PR2RTN1 =$80DB    PRSPACE =$80DC    PRS     =$80E0
   PRSPACE1=$80EC    PRS1    =$80F2    PRSPACE2=$80FE    PRS2    =$8104
   NXTLINE =$8110    NL1     =$811A    NL2     =$8122    ALLDONE =$8123
   WDCALC  =$8129    WDCALC1 =$8135    SET1    =$8142  ? S1      =$8145
   WDCALC2 =$8154    SET2    =$8161  ? S2      =$8164  ? ADDWD   =$8167
   ADDWD1  =$8175    OUTSTR  =$8182    MO      =$8186    M1      =$8193
   OUTBYTE =$8197    PB1     =$819A    GRLINE  =$81A0    OUTIT   =$81AD
 ? MULT8   =$81B1    MUL1    =$81BB    MUL2    =$81C4    STRING  =$81D0
   GRSETUP =$81D0    GRPRINT =$81D9  ? TEXTSET =$81DE    TABSET  =$81E7
 ? RESET   =$81EC    CRLF    =$81F0    TMP     =$81F4    PRTOUT  =$C090
   PRTRDY  =$C1C1
```

LISTING 5

```
10  HOME : PRINT "DHR.LOGOPRINT T
    EST ROUTINE"
15  PRINT  CHR$ (4);"BLOAD DHR.LO
    GOPRINT"
20  PRINT : INPUT "NAME OF TABLE
    1: ";T1$
30  PRINT  CHR$ (4);"BLOAD"T1$",A
    $4000"
40  PRINT : INPUT "NAME OF TABLE
    2: ";T2$
50  PRINT  CHR$ (4);"BLOAD"T2$",A
    $6000"
60  PRINT : INPUT "HOW MANY BIT-W
    IDE SPACES BETWEEN TABLES?";
    SP
62  PRINT : INPUT "LEFT MARGIN: "
    ;TA
65  PRINT : INPUT "VERTICAL POSIT
    ION OF TABLE 1: ";T1: PRINT
    : INPUT "VERTICAL POSITION O
    F TABLE 2: ";T2
66  POKE 8,SP - (256 *  INT (SP /
    256)): POKE 9, INT (SP / 256
    ): POKE 239,TA
70  POKE 235,0: POKE 236,64: POKE
    237,0: POKE 238,96: POKE 250
    ,T1: POKE 251,T2
80  CALL 32768
```

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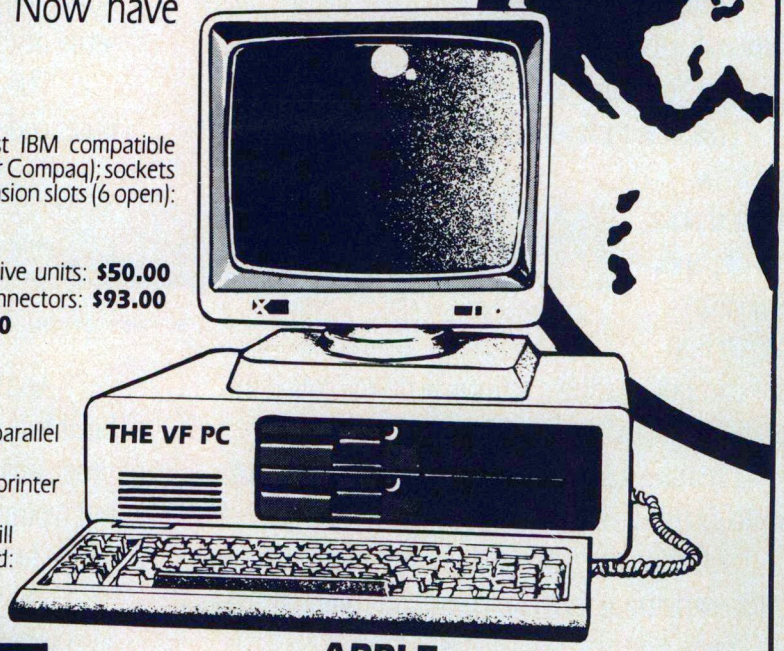

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- Motherboard resides on card in slot of IBM compatible motherboard.
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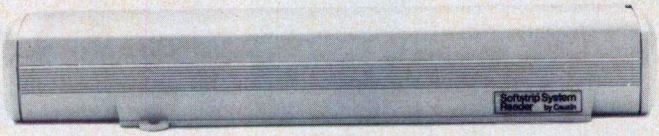
CIRCLE 45 READER SERVICE CARD

It's amazing what you can reveal when you strip.

Introducing a shape that's about to turn on an entire industry.

The Softstrip™ data strip. From Cauzin.

This new technology allows text, graphics, and data to be encoded on a strip of paper, then easily entered into your computer using a scanning device called the Cauzin Softstrip™ System Reader.



The Cauzin Softstrip System Reader replaces tedious typing by scanning the strip and reading it into your computer.

Creating a simple, reliable and cost efficient way to distribute and retrieve information.

Softstrip data strips, like those you see here, can contain anything that can be put on magnetic disks.

Facts. Figures. Software programs.

Video games. Product demonstrations. Sheet music.

The Cauzin Softstrip System Reader is now compatible with the IBM PC, Apple II and Macintosh.

A single strip can hold up to 5500 bytes of encoded data.

It can stand up to wrinkles, scratches, ink marks, even coffee stains.

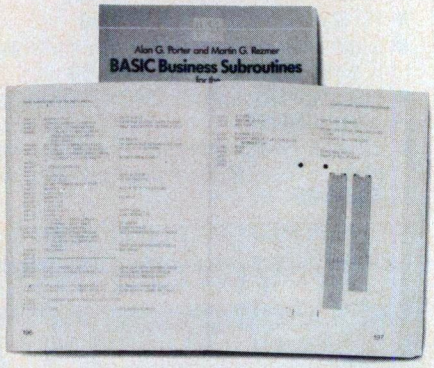
And it can be entered into your computer with a higher degree of reliability than most magnetic media.

Simply by plugging the Cauzin Reader into your serial or cassette port and placing it over the strip.

The reader scans the strip, converts it to computer code, and feeds it into any standard communication interface.

Because strips are so easy to generate, most of your favorite magazines and books will soon be using them in addition to long lists of program code.

And you'll be able to enter programs without typing a single line.



Soon everyone will be stripping as data strips appear in popular magazines, computer books and text books.

There is also software for you to generate your own strips. Letting you send everything from correspondence to business information using our new technology.

Find out how much you can reveal by stripping. Just take this ad to your computer dealer for a demonstration of the Cauzin Softstrip System Reader.

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CIRCLE 14 READER SERVICE CARD

AH! THOSE MARVELOUS GAME SOUNDS

Have you ever wondered where those marvelous sounds came from on your favorite video game?

The two data strips on the near right contain a portion of the program SOUND TESTER by Ed Sachs, which appeared in the March 1986 issue. This machine language program helps you generate both tones and background effects to enhance your own programs.

Read in the strips and run the program. Exit early by pressing CONTROL-RESET.

PICTURE PACKING PROGRAM

One of the most useful utilities available to Apple II users is high resolution picture packers (say that 10 times fast.) They are commonly used to store more pictures on a disk than is normally possible. For instance, an entire slide show can be stored within RAM.

DEMO is a short BASIC program that simply packs and unpacks pictures on a disk. It will give you a flavor of the more extensive program Hi-res Packer by Michael Ackerman, which appeared in the October 1985 issue.

Read in the data strip on the far right and run the program. To exit early press CONTROL-RESET.

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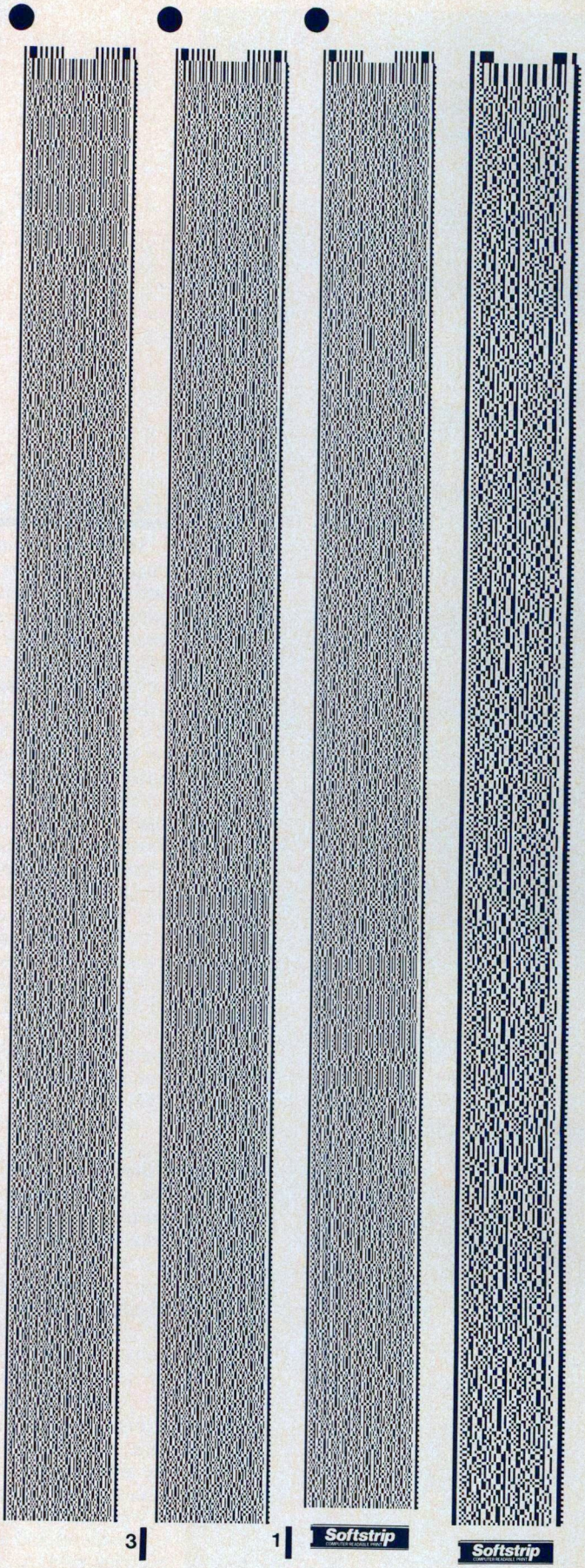
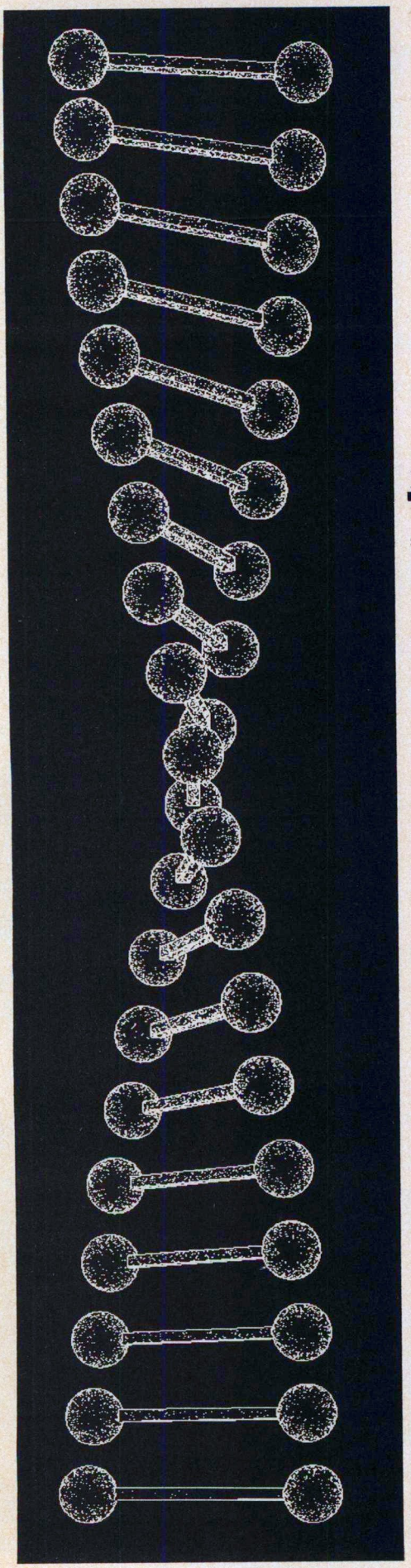
StripWare Library Nos. 185-186





Silicon Intelligence

Michael & Lisa Storrie-Lombardi

While numerous articles in the personal computer literature have established "artificial intelligence" (AI) and "expert systems" as the newest venture capitalist buzzwords, AI has yet to impact the majority of personal computer users. LISP, the classical language for AI programmers in this country, takes so much memory that no one could figure out how to use it for serious program development on the Apple II series machines.

Two of our English brethern have finally come to our rescue. In 1983 Chris Naylor first produced a text on expert system development using Applesoft BASIC for the Apple II and Spectrum BASIC for the Sinclair. In 1985 he joined with Richard Forsyth to continue the translation of AI techniques into the world of Applesoft. While BASIC does not have all the niceties of LISP, you can certainly produce intriguing and even helpful programs as you learn the fundamental advantages and limitations of "intelligent" systems.

Many of the new breed of high priced expert systems may look quite "intelligent" at first blush. However, some of the underlying assumptions and techniques may or may not fit your particular area of expertise. With at least a working knowledge of how Expert Systems function, we will all feel a lot better about plunking down several hundred dollars for a "co-expert" to help us through our tax returns, investment strategy, physics homework, or dating dilemmas.

To that end, two of your persevering writers have decided to wade into the arcane mysteries of AI. We hope you will enjoy journeying along with us. In upcoming issues of *Call-A.P.P.L.E.* we shall gradually wind our way through some of the central concepts and hot topics in this rapidly evolving field. At present we cannot tell if the development community will target the Apple II series machines for a variety of Expert Systems the way they have the Macintosh. If that happens, we shall gradually intersperse the tutorial with in-depth reviews of commercial products as long as our bank account or the generosity of developers holds out. Because both time and space for this issue have disappeared down a friendly black hole, we shall keep this introduction short and really begin our journey next time. We thought providing you with a list of some of the texts that have helped us the most would get us off to good start.

Chris Naylor, *Build Your Own Expert System,* Halsted Press, a division of John Wiley & Sons, Inc., New York, 1985.

This delightful text makes it possible for you to learn by writing programs even if you have never thought about how one might design an expert system. Naylor leads you carefully through the differences between general purpose thinking machines and knowledge specific program development. He does a good job dispelling the mystique of AI and encourages the reader to try to experience the mindset of the current leaders in the AI field. He points out the three main disadvantages of most expert systems: we usually don't have one, the ones we do get in our hands we don't know how they work, and when we start really using them in our area of expertise we find out the programmer had no idea how we really perform. Naylor takes us through the basic concepts of writing a program that will learn by example, build a database, set up a rule base, and then take a shot at medical diagnosis, prospecting, or (Seattle members pay attention) try to predict the weather. Highly recommended even if you have no interest in BASIC or AI. This book just might give you significant insight into how a great many of us make decisions.

Forsyth, Richard, and Chris Naylor, *The Hitch-hiker's Guide to Artificial Intel-*

ligence, Chapman and Hall/Methuen, London and New York, 1985.

After an excellent rapid overview of the beginnings of AI work, Forsyth and Naylor introduce you to exciting work in natural language, computer vision, techniques of machine learning, methods of representing knowledge, problem solving strategies, game strategies, and creative computers. Compared to Naylor's earlier work, this text moves on beyond the core concepts to provide coverage of the theoretical underpinnings of AI. The Applesoft programs show you how to teach your Apple to "parse" (read), design a simplified model of the retina, create a robot that can learn a maze, play statistical search tricks like the drunkard's walk, and perform breadth-first, least-cost-first, and best-first searches. You can teach your machine to play the 15-tile puzzle game, set up a four-site computer game, or even *see what a picture sounds like and a tune looks like!* Finally, you get a brief introduction into the ways a particular computer language can inaccurately manipulate your concept of what a computer can and cannot do. An excellent introduction to the world of AI, we shall refer to this text repeatedly during the course of this column.

Winston, Patrick Henry, *Artificial Intelligence (Second Edition),* Addison-Wesley, Reading, MA, 1984.

After a comprehensive introduction, this classic text covers critical concepts such as description matching, goal reduction, natural constraints, depth-first searches, the MINIMAX procedure, ALPHA-BETA procedure, forward and backward chaining, recursion, rule-based system limitations, the representation of common sense knowledge, learning rules from experience, and techniques for understanding human language. He also reviews such landmark systems as MYCIN, DENDRAL, and TEIRESIAS. Professor Winston has compiled an impressive list of credits in his work at MIT's artificial intelligence laboratory. This text ranks as a must for anyone with significant interest in AI.

Now if you hurry out and read all three of these texts before next time, please come help us write this column. As you work along with us, expanding some of the programs we produce, please let us hear from you.

If you have started working on AI projects in a language other than BASIC (Logo, one of the "microlisps",...) or have started investigating a particular vertical market expert system, let us hear about it!! We shall pass on your discoveries or questions here in the pages of *Call -A.P.P.L.E.* Until next time... keep thinking. We look forward to the journey.

Michael C. Storrie-Lombardi, M.D. obtained a B.A. in Radiation Physics from Florida State University in 1964 and a Doctorate of Medicine from the University of Florida in 1968. He is a Diplomate of the American Board of Psychiatry and Neurology, and Associate Clinical Professor of Psychiatry and Behavioral Sciences at the University of Washington College of Medicine.

Lisa J. Storrie-Lombardi obtained a B. A. in Business Administration, Magna Cum Laude, from the University of Washington in 1982 and will receive a Bachelor of Science in Physics from the University of Washington in June. She will begin work on her doctorate in physics in September.

The Storrie-Lombardis have mutual interests in high resolution imaging systems, astronomy, "Lisa-Generation" computers, and a small kitten named Taska. Together they serve as co-directors of Chrysalis Scientific, Inc., a private research organization. On a particularly grey Seattle day last winter, they began to worry that neither humans nor computers could think as well as Taska. Hence their interest in artificial intelligence. If anyone knows how to outsmart a truly wise kitty, please write the necessary algorithm and telecommunicate it collect to them.

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New word processing power

MacroWorks streamlines AppleWorks word processing with a multitude of new features. For example, one quick keystroke now deletes the *character* or the *word* at the cursor.

```
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        6502 Disk Drive
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```

Macros let you type almost anything with just one keystroke.

Use one keystroke* to jump to the start or end of a line of text. Another keystroke will erase an entire line. Change your mind? Apple-U will instantly "Undo" your last delete command!

AppleWorks Macros

MacroWorks will convert any series of keystrokes into a new one-keystroke AppleWorks command. Use MacroWorks' built-in macros, or define your own. For example, make Apple-N type your name and address. Or let Apple-X Save or Print *all* of your desktop files, nonstop.

For AppleWorks' Word Processor, Data Base and Spreadsheet

The possibilities are endless. For example, you may want to skip unwanted questions like *"How many copies?"* and *"Are you sure...?"*. Or search and replace printer commands (change all underlined words to bold, etc.).

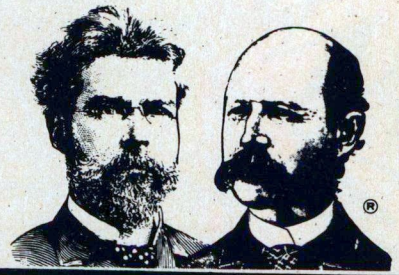
* *These are Solid-Apple commands. All original commands stay intact.*

Boot AppleWorks and go

MacroWorks is *not* a time-consuming "pre-boot" disk. You boot AppleWorks like you always do, but now you've got MacroWorks' new features!

Customized Help!

MacroWorks lets you replace AppleWorks' Help screens with new information, like a list of new commands or important names and addresses.



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MacroWorks requires AppleWorks and an Apple IIc or 128K IIe.

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MacroWorks' *Galley* program prints your AppleWorks word processing files in side-by-side columns (two or three-wide) for faster and easier newsletter layouts.

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MacroWorks' *File Analyzer* program prints a sorted list of every word it finds, and reports the number of occurrences of each word, and the average word length. Great for making an index or glossary, or for analyzing your writing style.

COUNT	WORD
10	A
1	ADDRESS
1	ADDRESSES
6	ALL
1	ALMOST
1	ALWAYS

1	WORK
1	WRITING
9	YOU
1	YOU'VE
8	YOUR

TOTAL WORDS: 402
CHARACTERS : 2013
CHARS/WORD : 5.0

Alphabetize your catalogs

MacroWorks' *Alpha-Cat* program prints a sorted list of all the files (or just the AppleWorks files) on a disk. Perfect for disk I. D. labels!

$34.95 Friendly and unprotected

MacroWorks is easy-to-use, unprotected and compatible with all Apple IIc's and 128K IIe's. Like all Beagle Bros disks, you can make backups without hassle or special software.

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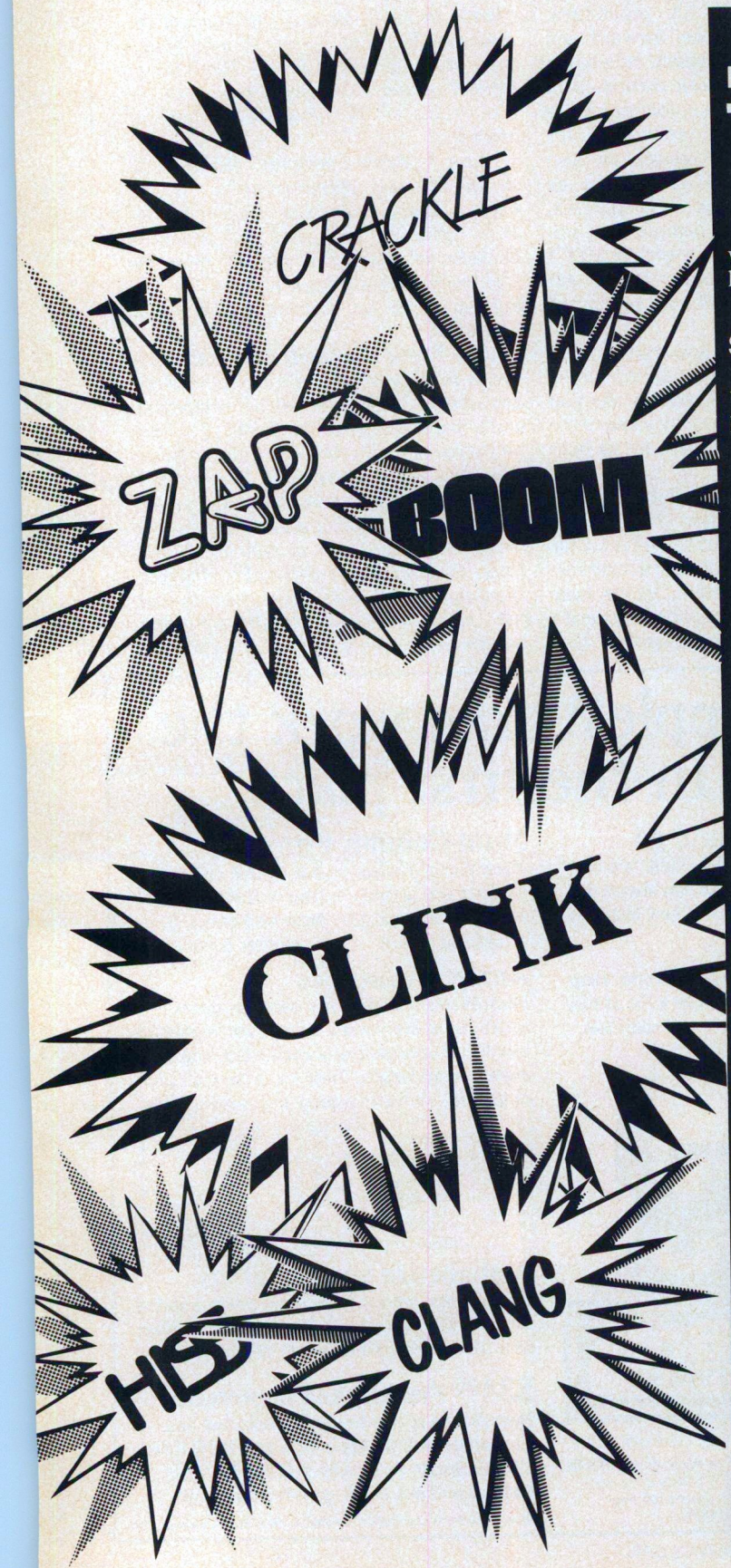
AD #MW1

CIRCLE 12 READER SERVICE CARD

Sound Tester—Part 2



Ed Sachs

SO we meet again. Did you have some fun? Did you discover sounds inherent in your Apple's speaker that you thought only the chip designers knew how to make? We showed them. We don't need their kind. But before we get our noses too high in the air, let me finish the story where I left off. I mean if we're going to be pompous, let's do it all the way.

Sound Tester Revisited

In our last episode I gave you Section 1 of the program. Without further adieu, I now present Sections 2 and 3 for your listening pleasure.

In recap, the program consists of three sections:

1) Create Your Own Noise or Tone
2) Auto-Generation
3) Random Generation

Section 1 allows you to enter your parameters and play away. Use this section once you discover the sound you like from the other sections. It confirms your findings and allows further modification. The "Hear Again" option allows a replay as many times as you wish.

Section 2 is a loop the loop. You can cycle through every variation of noise and tone. By setting the range starts, you can save yourself time and center in on the sound areas you want.

Section 3 uses David Sparks' "Random Generator" (See *Call -A.P.P.L.E.* May 1982) to choose the values. It's a rather comical section where you will be subjected to whistles, bleeps, machinery, honks and sounds of the like.

Both Sections 2 and 3 utilize the Space Bar to stop the action for jotting down values to be used in Section 1. Hitting the Bar again restarts generation. The Escape key will return the Main Menu to view.

Add It On

At this point, in order to continue you must load Part 1 from the March 1986 issue of *Call -A.P.P.L.E.* Part 2 will not run without the ammended Part 1. Now, use your assembler and delete lines 582 and 583 from Part I, and append Part II. If you haven't purchased your Big Mac.C by now (Shame on you), then BLOAD SOUND TESTER, go to the Monitor, and enter the Hex numbers at the left starting at $OCAC. Now type:

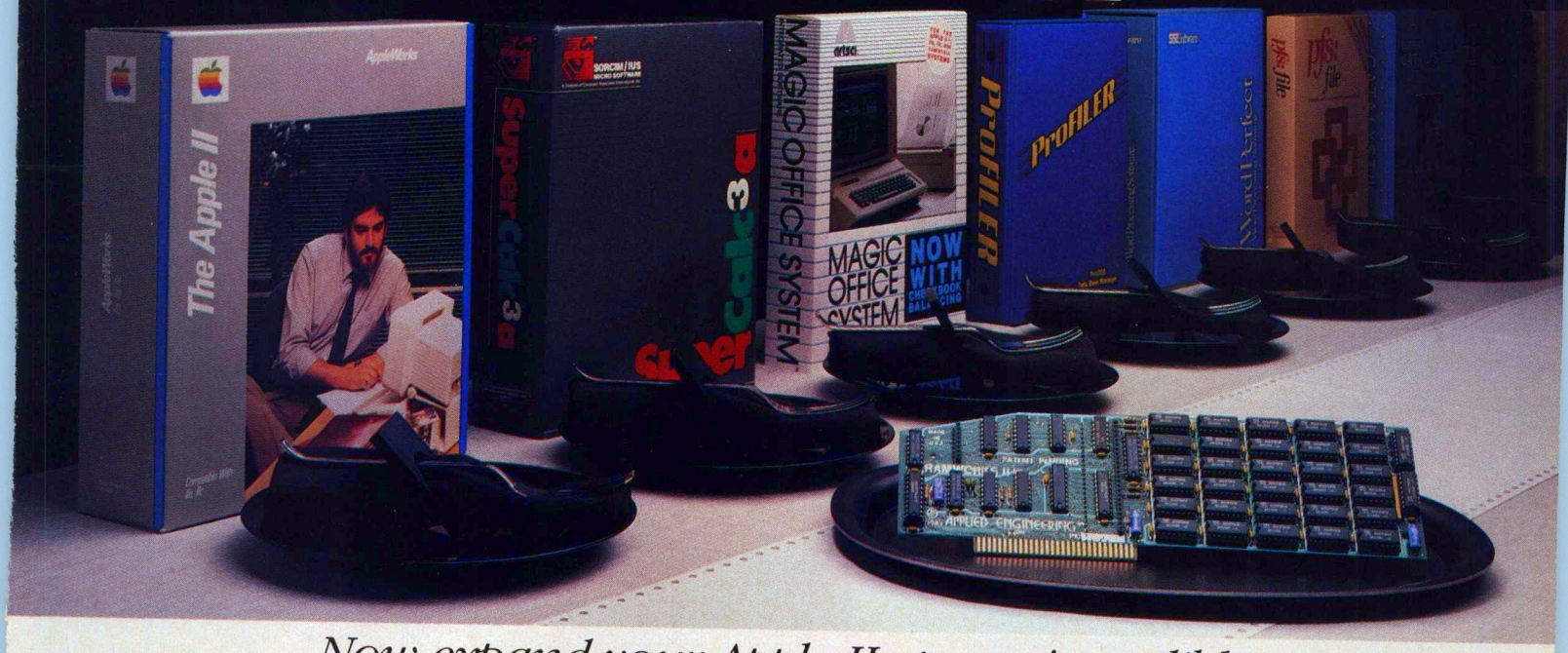
BSAVE SOUND TESTER, A$803, L$9F8

to save it back to disk. A BRUN SOUND TESTER will get it going, or a BLOAD SOUND TESTER and a CALL 2051 will do the same.

His Apple's Voice

Pretty wild stuff, huh? Did you find any neat ones? Keep experimenting. You'll find the ones you want. After awhile you'll know exactly where to start your search and be able to produce any sound at the drop of a hat. Amaze your friends.

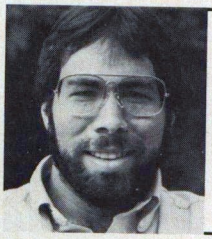
RamWorks II™
Up to 5,000,000 bytes to feed the biggest appetites.



Now expand your Apple IIe to an incredible 5 megabytes of usable RAM!

First came RamWorks. The IIe expansion card that became the unquestioned industry standard. Now Applied Engineering has done it one better … with RamWorks II — a card so advanced, so powerful, we challenge you to find *anything* it doesn't offer.

RamWorks II makes a single Apple go a miraculously long way. With all the additional memory you'll need to feed even the hungriest of programs. And with the included RamDrive™ software, even older programs can use RamWorks II memory.



"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak
Inventor of Apple Computer

Now AppleWorks works even better.

You can choose versions of RamWorks II ranging in power from 64K all the way up to a whopping 5 megabytes. Even a 256K RamWorks II gives you over 200K of additional usable AppleWorks desktop.

With a 256K or larger card, AppleWorks will automatically load itself into RamWorks II, dramatically increasing AppleWorks' speed and power by eliminating the time required to access disk drive 1. So you can switch from word processing to spreadsheet to database management at the speed of light.

Only RamWorks II eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 15,000. *Only* RamWorks II increases the number of lines permitted in the word processing mode. And *only* RamWorks II (256K or larger) offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

The most compatible, most expandable card available.

RamWorks II is compatible with more off-the-shelf software than any other RAM card, as well as *all* software written for Apple cards, and software written for most other RAM cards too! It's also compatible with all hardware add-ons like Profile and Sider hard disks.

As your needs grow, so does RamWorks II. It's designed to accommodate future advances in 16 and 32 bit microprocessors. A connector allows coprocessor cards to access up to 5 MEG of memory. RamWorks II is expandable to 1 MEG on the main card (more than most will ever need) … but if you do ever need more, a low-profile (no slot 1 interference) memory expansion connector allows you to add 512K, 2 MEG or 4 MEG of extra memory without wasting another slot.

And now, in living color …

For only $129, you can add RGB color for unsurpassed, super high-resolution color graphics and sharp 80 column text. *Without* wasting another slot — because our RGB option plugs right into RamWorks II (or original RamWorks) without slot 1 interference, and attaches to any Apple compatible RGB monitor (RGB option not necessary with a composite monitor). Order it now — or add it later.

Even corrects mistakes.

If you bought some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in for a nice surprise. Because all you have to do is plug the memory chips on your current card into the expansion sockets on RamWorks II to recapture most of your investment!

RamWorks II Prices:

with 64K ($179), with 256K ($219), with 512K ($269), with 1 MEG ($369), with 1.5 MEG ($539), with 3 MEG (CALL), with 5 MEG (CALL), RGB option ($129) (can be added later), 16 bit option ($89) (can be added later).

It's time you let *your* Apple handle a lot of big appetites. Order RamWorks II today … with 15-day money back guarantee *and* our "no hassle" five-year warranty. Call 9 a.m. to 11 p.m. 7 days, or send check or money order to Applied Engineering.

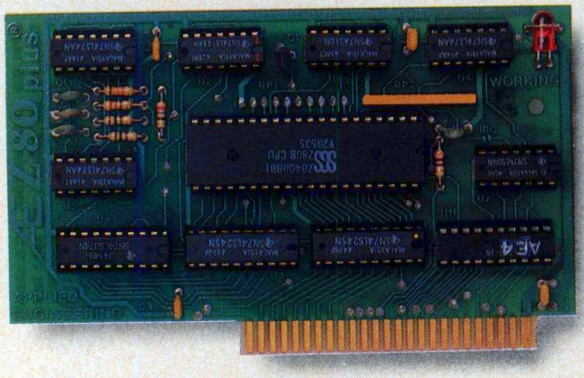
MasterCard, VISA and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

Applied Engineering
The Apple enhancement experts.

P. O. Box 798, Carrollton, TX 75006 (214) 241-6060

CIRCLE 2 READER SERVICE CARD

With Z-80 Plus,™ run CP/M®-the largest body of software in existence.



Now, get two computers in one, and all the advantages of both.

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering, and introduce your Apple IIe® or II+® to the thousands of CP/M programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system ever for running CP/M programs.

The new 4.0 boasts advanced features like built-in disk emulation for popular memory expansion boards, boosting both system speed and storage capacity. And menu-driven utilities that let you get to work faster. The Z-80 Plus also lets you run older CP/M programs — all the way down to Version 1.6 (2.2 is the most popular).

The Z-80 Plus is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have an extended 80-column card, all 128K is usable, and if you have RamWorks, up to 1088K is available.

Each Z-80 Plus comes with our CP/M Ram Drive software, enabling IIe owners to use an extended 80-column card or a RamWorks card as a high-speed Ram disk which runs CP/M software up to *twenty times faster.* So packages like WordStar and dBASE II run at blinding speed.

Simply plug the Z-80 Plus into any slot in your Apple. You'll get the benefits of two computers in one — all at an unbelievably low price (only $139!).

• Fully compatible with ALL CP/M software • Fully compatible with most hard disks, including Corvus and the Sider • Fully compatible with Microsoft disks (no pre-boot required) • Specifically designed for high speed operation in the Apple IIe (runs just as fast in the Apple II+ and Franklin) • Runs WordStar, dBASE II, Turbo Pascal, Fortran-80, Peachtree and ALL other CP/M software with *no pre-boot* • Semi-custom I.C. and low parts count allows Z-80 Plus to fly through CP/M programs with extremely low power consumption (we use the Z-80B) • Does EVERYTHING other Z-80 boards do, *plus* Z-80 interrupts • Five year warranty

Call to order today, 9 a.m. to 11 p.m. seven days, or send check or money order to Applied Engineering. MasterCard, VISA and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

Applied Engineering
P.O. Box 798, Carrollton, TX 75006
(214) 241-6060

CIRCLE 3 READER SERVICE CARD

In addition, McVay's routine is so fast that you can actually run sounds together. As a matter of fact, I added a delay (Using the Monitor Wait routine) to separate the sounds. Do a BC3:60 from the Monitor or POKE 3011,96 from BASIC. Go to Section 2 or 3 to hear the difference.

Finis

So there you have it. You now have a way to conjure up all the various sounds needed in your programs. Use the McVay's "Game Sounds" as a subroutine and "Sound Tester" to pinpoint sounds and never again will your programs go quiet. So look out Evil Target. If the Laser don't get ya, the sound will surely scare you back to the other side of Arcturus.

Enjoy.

Part 2 Sound Tester

```
0CA3: C6 02     579  NOD1     DEC  L-1
0CA5: D0 E0     580          BNE  LOOP2
0CA7: C6 03     581          DEC  L
0CA9: 10 DC     582          BPL  LOOP2
0CAB: 60        583  OUT     RTS
                584
                585  * SOUND TESTER - PART II
                586
                587  * AUTO-GENERATION CYCLES THROUGH
                588  * ALL POSSIBLE VARIABLES.
                589  *
                590  * ONE CAN SET STARTING VALUES TO
                591  * BETTER SPECIFY THE SEARCHING
                592  * RANGE.
                593
0CAC: 20 58 FC  594  AUTO    JSR  HOME
0CAF: A9 0C     595          LDA  #12
0CB1: 85 24     596          STA  CH         ;HTAB 13
0CB3: 20 85 0A  597          JSR  PRINT
0CB6: C1 D5 D4  598          ASC  "AUTO-GENERATION"8D
0CB9: CF AD C7 C5 CE C5 D2 C1
0CC1: D4 C9 CF CE 8D
0CC6: BD BD BD  599          ASC  "=======================================""00
0CC9: BD BD BD BD BD BD BD BD
0CD1: BD BD BD BD BD BD BD BD
0CD9: BD BD BD BD BD BD BD BD
0CE1: BD BD BD BD BD BD BD BD
0CE9: BD BD BD BD BD 00
0CEF: 20 A6 0A  600          JSR  RETURN
                601
                602  * CHOOSE NOISE OR TONE
                603
0CF2: A9 07     604  ATN     LDA  #7
0CF4: 20 5B FB  605          JSR  TABV       ;VTAB 8
0CF7: A9 05     606          LDA  #5
0CF9: 85 24     607          STA  CH         ;HTAB 6
0CFB: 20 EB 0A  608          JSR  TONO
0CFE: A5 06     609          LDA  TN
0D00: D0 06     610          BNE  ATN1
0D02: 20 2C 0C  611          JSR  RASB
0D05: 4C F2 0C  612          JMP  ATN
                613
0D08: A9 0A     614  ATN1    LDA  #10
0D0A: 20 5B FB  615          JSR  TABV       ;VTAB 11
0D0D: A9 05     616          LDA  #5
0D0F: 85 24     617          STA  CH         ;HTAB 6
0D11: 20 85 0A  618          JSR  PRINT
0D14: C5 CE D4  619          ASC  "ENTER RANGE START..."00
0D17: C5 D2 A0 D2 C1 CE C7 C5
0D1F: A0 D3 D4 C1 D2 D4 AE AE
0D27: AE 00
                620
                621  * CHOOSE LENGTH START
                622
0D29: A9 0D     623  ALEN    LDA  #13
0D2B: 20 5B FB  624          JSR  TABV       ;VTAB 14
0D2E: A9 08     625          LDA  #8
0D30: 85 24     626          STA  CH         ;HTAB 9
0D32: 20 9C FC  627          JSR  CLEOL      ;CLEAN UP.
0D35: 20 C6 0A  628          JSR  LENGTH
0D38: A5 08     629          LDA  TEMP2
0D3A: D0 06     630          BNE  ALEN2      ;OK SO FAR.
                631
0D3C: 20 2C 0C  632  ALEN1   JSR  RASB
0D3F: 4C 29 0D  633          JMP  ALEN
                634
0D42: A5 07     635  ALEN2   LDA  TEMP1
0D44: F0 F6     636          BEQ  ALEN1      ;UNDER RANGE.
0D46: 85 5A     637          STA  LTEMP
                638
0D48: A5 06     639          LDA  TN
0D4A: C9 02     640          CMP  #2         ;TONE?
0D4C: F0 20     641          BEQ  APIT       ;SKIP FILTER.
                642
                643  * CHOOSE FILTER START FOR NOISE
                644
0D4E: A9 10     645  AFIL    LDA  #16
0D50: 20 5B FB  646          JSR  TABV       ;VTAB 17
0D53: A9 08     647          LDA  #8
0D55: 85 24     648          STA  CH         ;HTAB 9
0D57: 20 9C FC  649          JSR  CLEOL      ;CLEAN UP.
0D5A: 20 37 0B  650          JSR  FILT
0D5D: A5 08     651          LDA  TEMP2
```

What the Experts are Saying About RamWorks II!®

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."
—*InfoWorld*

"AppleWorks wiped out Symphony... The competition was set up partly to show off another of Wozniak's favorite things, the RamWorks II memory expansion board from Applied Engineering . . ."
—*San Jose Business Journal*

"There are huge differences among the AppleWorks modifying programs sold with the cards. Without doubt, RamWorks II is the most powerful."
—*inCider*

"Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks. . . I like the product so much that I am buying one for my own system."
—*A+ Magazine*

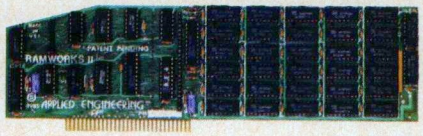
"RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars... For my money, Applied Engineering's RamWorks II is king of the hill."
—*inCider*

As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible". At least they agree on one thing. RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

Because RamWorks and Z-RAM have a mesmerizing list of characteristics that, as you use them, will change your perceptions of an Apple computer forever. Achieving a level of speed and performance most critics claim is the best they've ever seen. But we want to do more than impress the experts, we want to impress you!

Applied Engineering stands ready to solve your expansion needs today and tomorrow with the largest and best supported product line in the industry.

Call Applied Engineering at 214-241-6060, 9 am to 11 pm. To get the very best.



RamWorks II®

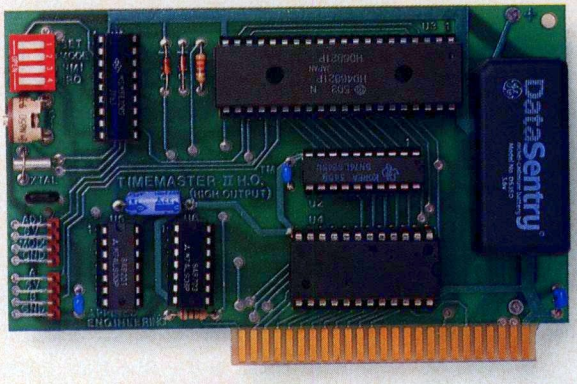
The recognized industry standard for memory expansion in the Apple IIe.

AE™

214-241-6060

CIRCLE 4 READER SERVICE CARD

Timemaster H.O.™, the only clock that displays time and date on AppleWorks'™ screens and files.



Now, get all the features of all the competition combined!

It's the smart way to put the time and date on your Apple II+® or IIe®. Because only the Timemaster H.O. packs *ALL* the features of all the competition *combined,* including leap year, year (not just in PRO-DOS), month, date, day of week, hours, minutes, seconds and milliseconds. It's totally PRO-DOS, DOS 3.3, PASCAL and CP/M compatible. And of course, it works better than any other clock with AppleWorks.

If you're using or writing software for other clock cards, you're still covered. Because the H.O. will *automatically* emulate them. And the Timemaster H.O. adds 14 new commands to BASIC. The H.O. even comes complete with two disks full of sample programs, including a computerized appointment book, a DOS dating program, interrupt programs, and over 30 programs that others charge extra for — or don't even offer.

As a low-cost option, you can add true BSR remote control to the H.O., giving you remote control of up to 16 lights and appliances in your home or office.

• Fully PRO-DOS and DOS 3.3, CP/M and PASCAL compatible • Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond capability); date with year, month, day of week and leap year • 24-Hour military format or 12-hour AM/PM format • Eight software controlled interrupts so you can run two programs at the same time (many examples included) • Can be set to the second • Allows AppleWorks to time and date stamp all data automatically • The only clock card that displays time and date on the AppleWorks screen • Five-year warranty

Clock price $129.00
BSR option (may be added later) ..... $ 49.00

Call to order today, 9 a.m. to 11 p.m. seven days, or send check or money order to Applied Engineering. MasterCard, VISA and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

Applied Engineering
P.O. Box 798, Carrollton, TX 75006
(214) 241-6060

CIRCLE 5 READER SERVICE CARD


```
0D5F: D0 06     652          BNE  AFIL1
0D61: 20 2C 0C  653          JSR  RASB
0D64: 4C 4E 0D  654          JMP  AFIL
                655
0D67: A5 07     656  AFIL1   LDA  TEMP1
0D69: 85 5B     657          STA  PFTEMP
0D6B: 4C BB 0D  658          JMP  ASTART     ;HERE WE GO.
                659
                660  * CHOOSE PITCH START FOR TONE
                661
0D6E: A9 10     662  APIT    LDA  #16
0D70: 20 5B FB  663          JSR  TABV       ;VTAB 17
0D73: A9 09     664          LDA  #9
0D75: 85 24     665          STA  CH         ;HTAB 10
0D77: 20 9C FC  666          JSR  CLEOL      ;CLEAN UP.
0D7A: 20 5C 0B  667          JSR  PIT
0D7D: A5 08     668          LDA  TEMP2
0D7F: D0 06     669          BNE  APIT1
0D81: 20 2C 0C  670          JSR  RASB
0D84: 4C 6E 0D  671          JMP  APIT
                672
0D87: A5 07     673  APIT1   LDA  TEMP1
0D89: 85 5B     674          STA  PFTEMP
                675
0D8B: A9 16     676  ASTART  LDA  #22
0D8D: 20 5B FB  677          JSR  TABV       ;VTAB 23
0D90: A9 05     678          LDA  #5
0D92: 85 24     679          STA  CH         ;HTAB 6
0D94: 20 85 0A  680          JSR  PRINT
0D97: D0 D2 C5  681          ASC  "PRESS ANY KEY TO BEGIN SOUND "00
0D9A: D3 D3 A0 C1 CE D9 A0 CB
0DA2: C5 D9 A0 D4 CF A0 C2 C5
0DAA: C7 C9 CE A0 D3 CF D5 CE
0DB2: C4 A0 00
0DB5: 20 0C FD  682          JSR  RDKEY
                683
                684  * SELECT PROPER HEADER
                685
0DB8: 20 58 FC  686  AUTOGO  JSR  HOME
0DBB: A9 09     687          LDA  #9
0DBD: 85 24     688          STA  CH         ;HTAB 10
0DBF: A5 06     689          LDA  TN
0DC1: C9 02     690          CMP  #2         ;TONE?
0DC3: D0 0C     691          BNE  AUTO1      ;NOPE - MUST BE NOISY.
0DC5: 20 85 0A  692          JSR  PRINT
0DC8: D4 CF CE  693          ASC  "TONE "00
0DCB: C5 A0 00
0DCE: 4C DB 0D  694          JMP  AUTO2
                695
0DD1: 20 85 0A  696  AUTO1   JSR  PRINT
0DD4: CE CF C9  697          ASC  "NOISE "00
0DD7: D3 C5 A0 00
                698
0DDB: 20 85 0A  699  AUTO2   JSR  PRINT
0DDE: C1 D5 D4  700          ASC  "AUTO-GENERATION"8D00
0DE1: CF AD C7 C5 CE C5 D2 C1
0DE9: D4 C9 CF CE 8D 00
0DEF: 20 42 0F  701          JSR  LAYOUT
0DF2: A9 00     702          LDA  #0
0DF4: 85 08     703          STA  TEMP2
0DF6: 85 5C     704          STA  DTEMP      ;SET DTEMP=0.
                705
                706  * TONE/NOISE LOOP
                707
0DF8: 4C 01 0E  708  ANOISE  JMP  TNLOOP
0DFB: E6 5A     709  LLOOP   INC  LTEMP
0DFD: E6 5B     710  PFLOOP  INC  PFTEMP
0DFF: E6 5C     711  DLOOP   INC  DTEMP
0E01: 20 2D 10  712  TNLOOP  JSR  FORMAT
0E04: 20 A4 0B  713          JSR  SOUND
0E07: 20 5E 11  714          JSR  SPESC
0E0A: A5 5C     715          LDA  DTEMP
0E0C: C9 FF     716          CMP  #$FF       ;END OF D LOOP?
0E0E: 90 EF     717          BCC  DLOOP
0E10: A5 5B     718          LDA  PFTEMP
0E12: C9 FF     719          CMP  #$FF       ;END OF F LOOP?
0E14: 90 E7     720          BCC  PFLOOP
0E16: A5 07     721          LDA  TEMP1      ;TEMP HAS ORIGINAL NO.
0E18: 38        722          SEC
0E19: E9 01     723          SBC  #1         ;TO EVEN OUT NEXT INC.
0E1B: 85 5B     724          STA  PFTEMP
0E1D: A5 5A     725          LDA  LTEMP
0E1F: C9 FF     726          CMP  #$FF       ;END OF L LOOP?
0E21: 90 D8     727          BCC  LLOOP
                728
                729  * THE LOOP'S END
                730
0E23: A9 8D     731          LDA  #$8D
0E25: 20 F0 FD  732          JSR  COUT1
0E28: A9 06     733          LDA  #6
0E2A: 85 24     734          STA  CH         ;HTAB 7
0E2C: 20 85 0A  735          JSR  PRINT
0E2F: D0 D2 C5  736          ASC  "PRESS ANY KEY FOR MAIN MENU "00
0E32: D3 D3 A0 C1 CE D9 A0 CB
0E3A: C5 D9 A0 C6 CF D2 A0 CD
0E42: C1 C9 CE A0 CD C5 CE D5
0E4A: A0 00
0E4C: 20 0C FD  737          JSR  RDKEY
0E4F: 4C 03 08  738          JMP  MENU
                739
                740  * RANDOM GENERATION LETS THE COMPUTER
                741  * DO THE CHOOSING.
                742  *
                743  * YOU WILL LOVE THE BLEEPS AND
                744  * BLOOPS.
                745  *
                746  * GUARANTEED TO DRIVE YOU UTTERLY
                747  * INSANE.
                748
0E52: 20 58 FC  749  RANDOM  JSR  HOME
0E55: A9 0B     750          LDA  #11
0E57: 85 24     751          STA  CH         ;HTAB 12
0E59: 20 85 0A  752          JSR  PRINT
```

(Continued on page 38)

HOT! SPECIAL! HOT! SPECIAL!

only $199

gets you BOTH
ACCELERATOR IIe by Titan Technologies
PINPOINT enhancements for AppleWorks
(See More details on pages 64 & 65)

The Accelerator IIe has proven itself to have a solid performance and compatibility record. Its high speed 65C02 processor cruises along at 3.5 times the standard speed sorting your databases, snapping those menus onto your screen, even speeding hard disk throughput. At this price, it is an excellent value. Compatible with Apple II, II+, IIe.

(Note: the Accelerator IIe dominates the Apple's DMA line when active. Check with us before buying if your computer has other DMA devices. Accelerator IIe is compatible with most memory boards and hard disks.)

Pinpoint adds some niceties to round out the functionality of AppleWorks: built-in modem communications, appointment calendar, calculator, word processor graphics merge, notepad, typewriter emulator, envelope addresser, phone dialer, quick label. Pinpoint runs only on enhanced 128K Apple IIe's and IIc's equipped with AppleWorks or certain other ProDOS-based programs.

PRODUCT CODE: HACCPT
SHIPPING WT: 1 LB.
PRICE: $199 (through 5/31/86)

NOW AVAILABLE!

EPSON PRINTERS

In response to your requests, the full line of Epson printers is now available through A.P.P.L.E. Co-op. Please call for price and availability.

The EPSON AP-80 complete with cable and printer stand for only $299!

FEATURES:

- FULLY compatible with Apple ImageWriter for all software and hardware
- SPEED: 75 characters per second draft, 15 CPS near letter quality
- SIZE: 9-17 characters per inch (6 choices), 72-136 characters per line
- STYLES: Standard, italic, superscript, subscript, user-definable
- PAPER FEED: Friction + tractor, auto single sheet load
- ALSO: 2K Buffer, left and right margin and tab setting

PRODUCT CODE:

HEPA8C (Epson AP80, printer stand, Apple IIc cable)
HEPA8M (Epson AP80, printer stand, Macintosh cable)
HEPA8E (Epson AP80, printer stand, Apple Super Serial Compatible cable)

Shipping Weight: 22 lbs.
Price: $299 (through 4/30/86)

ORDERING CHECKLIST

To speed all orders, please include:

1. Your Name as it appears in our records (same as on your mailing label).
2. Member number and expiration date.
3. Complete STREET ADDRESS (**not** Box number — see explanation below).
4. Phone number to reach you by day if we have questions.
5. Payment Including:
   Handling charge if applicable
   Domestic or Foreign Shipping Charges
   Magazine Postage if applicable
   (Sorry we do not accept COD or Purchase Orders on individual memberships.)

Each item you order needs:

6. Complete product name (and version if there is more than one product of that type). Specify computer model you are using.
7. Product Code

SHIPPING ADDRESS: We normally ship products by United Parcel Service (UPS). Therefore, the shipping address on your order cannot be a post office box. You may specify a P.O. Box for orders weighing less than 8 ounces. You also may make special arrangements for shipping some items via US Mail, Air Parcel Post, or UPS Second Day Air.

DOMESTIC SHIPPING CHARGES

SHIPPING WEIGHT	COST
Up to 5 Lbs.	$ 2.00
5-10 Lbs.	3.00
10-15 Lbs.	4.00
15-20 Lbs.	5.00
20-25 Lbs.	6.00
25-30 Lbs.	7.00
30-35 Lbs.	8.00
35-40 Lbs.	9.00
40-45 Lbs.	10.00
45-50 Lbs.	11.00

UPS 2ND DAY AIR

WEIGHT NOT TO EXCEED	48STATES A	HAWAII D
1 lb.	$ 3.00	$ 4.53
2 "	4.00	5.71
3 "	5.00	6.89
4 "	6.00	8.07
5 "	6.50	9.25
6 "	7.50	10.43
7 "	8.50	11.61
8 "	9.50	12.79
9 "	10.50	13.97
10 "	11.50	15.15
11 "	12.50	16.33
12 "	13.50	17.51
13 "	14.50	18.69
14 "	15.50	19.87
15 "	16.50	21.05
16 "	17.50	22.23
17 "	18.50	23.41
18 "	19.50	24.59
19 "	20.00	25.77
20 "	21.00	26.95
21 "	22.00	28.13
22 "	23.00	29.31
23 "	24.00	30.49
24 "	25.00	31.67
25 "	26.00	32.85

FOREIGN SHIPPING CHART

POSTAL TABLE	Zone I West Indies Central America, Columbia, Venezuela	Zone II All South American Countries (except in Table I), Europe, N. Africa	Zone III Asia, Mid East, S. Africa Australia and Pacific Islands
0-4 oz.	$ 1.51	$ 1.96	$ 2.41
4-8 oz.	2.13	3.95	3.95
8-12 oz.	2.75	4.12	5.49
12-16	3.37	5.20	7.03
16-20 oz.	3.99	6.28	8.57
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24-32 oz.	5.85	9.52	13.19
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Each additional ½ lb. over 4 pounds add:	1.22	2.16	3.10

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Let's compare Apples™ to Apples™.

An Apple IIc

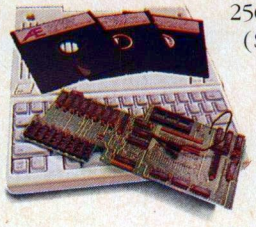
An Apple IIc with Z-RAM

The Apple IIc on the right works exactly the same as the Apple IIc on the left. Almost. The Apple on the right has a powerful memory expansion coprocessing card called Z-RAM. From Applied Engineering. Which means the Apple on the right can completely load AppleWorks into RAM—and then run it up to thirty times faster than the Apple on the left.

Z-RAM also acts as a solid-state disk drive. Which means the Apple on the right will load and store programs up to 30 times faster. And, our included RAM disk is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

Turbo Charged AppleWorks.

Even a 256K Z-RAM can completely load AppleWorks into RAM. With Z-RAM, the moment your fingers touch the keyboard AppleWorks responds. A 256K Z-RAM lets your IIc run AppleWorks up to 30 times faster, increases available desktop to 235K and maximum number of records from 1,350 to over 15,000, quadruples the number of lines allowed in the word processor, provides a print spooler, and auto-segments large files so they can be saved on two or more disks. A 512K Z-RAM boosts AppleWorks desktop to an incredible 425K.



Take a closer look.

There's more. Z-RAM has a built-in high speed Z-80B microprocessor that allows you to run CP/M programs. Which means you now have access to the single largest body of software in existence, including popular packages like WordStar, dBase II, Turbo PASCAL and Microsoft BASIC. A 16 bit option is also available.

And still more. Z-RAM is compatible with all IIc software and hardware, installs easily in just ten minutes with a screwdriver (slightly longer without), is available with 256K or 512K of additional memory (a 256K Z-RAM can be upgraded to 512K at any time). Z-RAM is easily handled by the IIc power supply with our patent pending power saving design.

The only thing better than that would be a recommendation from Steve Wozniak.

> *"I recommend Applied Engineering products whole-heartedly." (Of course, Steve's IIc has a Z-RAM installed.)*
>
> *Steve Wozniak, the creator of Apple Computer*

For fast response.

Z-RAM comes complete with simple instructions, RAM disk software, Z-80 operating system, CP/M manual. And a five year "hassle free" warranty. Make a good Apple great. With 256K Z-RAM "384K total" ($329); with 512K "640K total" ($389); 16 bit option may be added later ($89).

If you want to run CP/M software, but don't need more memory, we suggest our Z-80c card. The Z-80c has no memory expansion ports and is priced at only $159.

Call 214-241-6060 TO ORDER TODAY. 9 a.m. to 11 p.m. Seven days, or send check or money order to Applied Engineering. MasterCard, Visa and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

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CIRCLE 6 READER SERVICE CARD

```
0E5C: D2 C1 CE  753           ASC  "RANDOM GENERATOR"8D
0E5F: C4 CF CD A0 C7 C5 CE C5
0E67: D2 C1 D4 CF D2 8D
0E6D: BD BD BD  754           ASC  "========================================"00
0E70: BD BD BD BD BD BD BD BD
0E78: BD BD BD BD BD BD BD BD
0E80: BD BD BD BD BD BD BD BD
0E88: BD BD BD BD BD BD BD BD
0E90: BD BD BD BD BD 00
0E96: 20 A6 0A  755           JSR  RETURN
                756
0E99: A9 0B     757  RTN      LDA  #11
0E9B: 20 5B FB  758           JSR  TABV       ;VTAB 12
0E9E: A9 05     759           LDA  #5
0EA0: 85 24     760           STA  CH         ;HTAB 6
0EA2: 20 EB 0A  761           JSR  TONO
0EA5: A5 06     762           LDA  TN
0EA7: D0 06     763           BNE  RAND1      ;VALID ENTRY.
0EA9: 20 2C 0C  764           JSR  RASB
0EAC: 4C 99 0E  765           JMP  RTN
                766
0EAF: A9 16     767  RAND1    LDA  #22
0EB1: 20 5B FB  768           JSR  TABV       ;VTAB 23
0EB4: A9 05     769           LDA  #5
0EB6: 85 24     770           STA  CH         ;HTAB 6
0EB8: 20 85 0A  771           JSR  PRINT
0EBB: D0 D2 C5  772           ASC  "PRESS ANY KEY TO BEGIN SOUND "00
0EBE: D3 D3 A0 C1 CE D9 A0 CB
0EC6: C5 D9 A0 D4 CF A0 C2 C5
0ECE: C7 C9 CE A0 D3 CF D5 CE
0ED6: C4 A0 00
0ED9: 20 0C FD  773           JSR  RDKEY      ;RESEEDS RNDL & RNDH.
0EDC: 20 84 11  774           JSR  INITRND
                775
                776  * SELECT HEADER
                777
0EDF: 20 58 FC  778           JSR  HOME
0EE2: A9 09     779           LDA  #9
0EE4: 85 24     780           STA  CH         ;HTAB 10
0EE6: A5 06     781           LDA  TN
0EE8: C9 02     782           CMP  #2         ;TONE?
0EEA: D0 0C     783           BNE  RAND2      ;TOO NOISY.
0EEC: 20 85 0A  784           JSR  PRINT
0EEF: D4 CF CE  785           ASC  "TONE "00
0EF2: C5 A0 00
0EF5: 4C 02 0F  786           JMP  RAND3
                787
0EF8: 20 85 0A  788  RAND2    JSR  PRINT
0EFB: CE CF C9  789           ASC  "NOISE "00
0EFE: D3 C5 A0 00
                790
0F02: 20 85 0A  791  RAND3    JSR  PRINT
0F05: D2 C1 CE  792           ASC  "RANDOM GENERATION"8D00
0F08: C4 CF CD A0 C7 C5 CE C5
0F10: D2 C1 D4 C9 CF CE 8D 00
0F18: 20 42 0F  793           JSR  LAYOUT
0F1B: A9 00     794           LDA  #0
0F1D: 85 08     795           STA  TEMP2
                796
                797  * GET LENGTH
                798
0F1F: 20 A2 11  799  RANDL    JSR  RNDGEN
0F22: A5 52     800           LDA  XTND
0F24: F0 F9     801           BEQ  RANDL      ;UNDER RANGE.
0F26: 85 5A     802           STA  LTEMP
                803
                804  * GET PITCH/FILTER
                805
0F28: 20 A2 11  806  RANDF    JSR  RNDGEN
0F2B: A5 52     807           LDA  XTND
0F2D: 85 5B     808           STA  PFTEMP
                809
                810  * GET DELTA
                811
0F2F: 20 A2 11  812  RANDD    JSR  RNDGEN
0F32: A5 52     813           LDA  XTND
0F34: 85 5C     814           STA  DTEMP
                815
0F36: 20 2D 10  816           JSR  FORMAT
0F39: 20 A4 0B  817           JSR  SOUND
0F3C: 20 5E 11  818           JSR  SPESC      ;THE ONLY WAY OUT OF THIS
0F3F: 4C 1F 0F  819           JMP  RANDL      ;NEVER-ENDING LOOP.
                820
                821
                822  * LAYOUT SUB
                823
0F42: 20 85 0A  824  LAYOUT   JSR  PRINT
0F45: A0 CC C5  825           ASC  " LENGTH   PITCH   FILTER   DELTA   SWEEP"
0F48: CE C7 D4 C8 A0 A0 A0 D0
0F50: C9 D4 C3 C8 A0 A0 A0 C6
0F58: C9 CC D4 C5 D2 A0 A0 A0
0F60: C4 C5 CC D4 C1 A0 A0 A0
0F68: D3 D7 C5 C5 D0
0F6D: BD BD BD  826           ASC  "========================================"00
0F70: BD BD BD BD BD BD BD BD
0F78: BD BD BD BD BD BD BD BD
0F80: BD BD BD BD BD BD BD BD
0F88: BD BD BD BD BD BD BD BD
0F90: BD BD BD BD BD 00
0F96: A9 03     827           LDA  #3
0F98: 85 22     828           STA  WNDTOP
0F9A: A9 16     829           LDA  #22
0F9C: 20 5B FB  830           JSR  TABV       ;VTAB 23
0F9F: 20 85 0A  831           JSR  PRINT
0FA2: BD BD BD  832           ASC  "======================================="
0FA5: BD BD BD BD BD BD BD BD
0FAD: BD BD BD BD BD BD BD BD
0FB5: BD BD BD BD BD BD BD BD
0FBD: BD BD BD BD BD BD BD BD
0FC5: BD BD BD BD BD
0FCA: A0 D3 D0  833           ASC  " SPACE = STOP/START     ESC = MAIN MENU"00
0FCD: C1 C3 C5 A0 BD A0 D3 D4
0FD5: CF D0 AF D3 D4 C1 D2 D4
0FDD: A0 A0 A0 A0 A0 C5 D3 C3
0FE5: A0 BD A0 CD C1 C9 CE A0
0FED: CD C5 CE D5 00

0FF2: A9 16     834           LDA  #22
0FF4: 85 23     835           STA  WNDBTM
0FF6: 20 58 FC  836           JSR  HOME
0FF9: 60        837           RTS
                838
                839  * HEX TO DEC SUB
                840
0FFA: 85 08     841  HEXDEC   STA  TEMP2
0FFC: A2 00     842           LDX  #0
0FFE: 86 1B     843           STX  HDH        ;RESET TO 0
1000: 86 1A     844           STX  HDL
1002: 29 0F     845           AND  #$0F       ;STRIP HIGH BITS.
1004: F0 0D     846           BEQ  HD1
1006: AA        847           TAX
1007: A9 00     848           LDA  #0
                849
1009: F8        850           SED
100A: 18        851  HDLOOP   CLC
100B: 69 01     852           ADC  #1
100D: CA        853           DEX
100E: D0 FA     854           BNE  HDLOOP
1010: 85 1A     855           STA  HDL
1012: D8        856           CLD
                857
1013: A5 08     858  HD1      LDA  TEMP2
1015: 4A        859           LSR
1016: 4A        860           LSR
1017: 4A        861           LSR
1018: 4A        862           LSR             ;RIGHT 4X
1019: F0 11     863           BEQ  HD2
101B: AA        864           TAX
101C: A5 1A     865           LDA  HDL
                866
101E: F8        867           SED
101F: 18        868  HDLOOP1  CLC
1020: 69 16     869           ADC  #$16       ;X*16
1022: 90 02     870           BCC  HDLOOP2
1024: E6 1B     871           INC  HDH
1026: CA        872  HDLOOP2  DEX
1027: D0 F6     873           BNE  HDLOOP1
1029: 85 1A     874           STA  HDL
102B: D8        875           CLD
                876
102C: 60        877  HD2      RTS
                878
                879  * FORMAT SUB
                880
102D: A5 08     881  FORMAT   LDA  TEMP2      ;TO CONTROL SCROLL.
102F: F0 05     882           BEQ  FORSTART
1031: A9 8D     883           LDA  #$8D       ;CAUSE SCRN SCROLL.
1033: 20 F0 FD  884           JSR  COUT1
                885
                886  * FORMAT LENGTH
                887
1036: A5 5A     888  FORSTART LDA  LTEMP
1038: 20 FA 0F  889           JSR  HEXDEC
103B: A5 1B     890           LDA  HDH
103D: F0 0F     891           BEQ  FORL1      ;0 IN 100'S PLACE.
103F: 18        892           CLC
1040: 69 B0     893           ADC  #$B0       ;RESTORE HIGH BITS FOR COUT1.
1042: A2 03     894           LDX  #3
1044: 86 24     895           STX  CH         ;HTAB 4
1046: 20 F0 FD  896           JSR  COUT1
1049: A5 1A     897           LDA  HDL
104B: 4C 58 10  898           JMP  FORL2
                899
104E: A5 1A     900  FORL1    LDA  HDL
1050: C9 10     901           CMP  #$10
1052: 90 0A     902           BCC  FORL3      ;0 IN 10'S PLACE.
1054: A2 04     903           LDX  #4
1056: 86 24     904           STX  CH         ;HTAB 5
                905
1058: 20 DA FD  906  FORL2    JSR  PRBYTE     ;LEAVE BYTE ALONE.
105B: 4C 68 10  907           JMP  FORTN
                908
105E: 18        909  FORL3    CLC
105F: 69 B0     910           ADC  #$B0       ;FOR COUT1.
1061: A2 05     911           LDX  #5
1063: 86 24     912           STX  CH         ;HTAB 6
1065: 20 F0 FD  913           JSR  COUT1
                914
1068: A5 06     915  FORTN    LDA  TN
106A: C9 01     916           CMP  #1         ;NOISE?
106C: D0 0E     917           BNE  FORP       ;NO - GO TO PITCH.
106E: A2 0B     918           LDX  #11
1070: 86 24     919           STX  CH         ;HTAB 12
1072: 20 85 0A  920           JSR  PRINT
1075: CF C6 C6  921           ASC  "OFF"00 ;PITCH OFF.
1078: 00
1079: 4C BC 10  922           JMP  FORF       ;NOISE ON.
                923
                924  * FORMAT PITCH
                925
107C: A5 5B     926  FORP     LDA  PFTEMP
107E: 20 FA 0F  927           JSR  HEXDEC
1081: A5 1B     928           LDA  HDH
1083: F0 0F     929           BEQ  FORP1      ;0 IN 100'S PLACE.
1085: 18        930           CLC
1086: 69 B0     931           ADC  #$B0       ;FOR COUT1.
1088: A2 0B     932           LDX  #11
108A: 86 24     933           STX  CH         ;HTAB 12
108C: 20 F0 FD  934           JSR  COUT1
108F: A5 1A     935           LDA  HDL
1091: 4C 9E 10  936           JMP  FORP2
                937
1094: A5 1A     938  FORP1    LDA  HDL
1096: C9 10     939           CMP  #$10
1098: 90 0A     940           BCC  FORP3      ;0 IN 10'S PLACE.
109A: A2 0C     941           LDX  #12
109C: 86 24     942           STX  CH         ;HTAB 13
                943
109E: 20 DA FD  944  FORP2    JSR  PRBYTE     ;LEAVE BYTE ALONE.
10A1: 4C AE 10  945           JMP  FOFF
                946
10A4: 18        947  FORP3    CLC
10A5: 69 B0     948           ADC  #$B0       ;FOR COUT1.
```

```
10A7: A2 0D     949          LDX  #13
10A9: 86 24     950          STX  CH         ;HTAB 14
10AB: 20 F0 FD  951          JSR  COUT1
                952
10AE: A2 14     953 FOFF     LDX  #20
10B0: 86 24     954          STX  CH         ;HTAB 21
10B2: 20 85 0A  955          JSR  PRINT
10B5: CF C6 C6  956          ASC  "OFF"00 ;FILTER OFF - PITCH ON.
10B8: 00
10B9: 4C EE 10  957          JMP  FORD
                958
                959 * FORMAT FILTER
                960
10BC: A5 5B     961 FORF     LDA  PFTEMP
10BE: 20 FA 0F  962          JSR  HEXDEC
10C1: A5 1B     963          LDA  HDH
10C3: F0 0F     964          BEQ  FORF1      ;0 IN 100'S PLACE.
10C5: 18        965          CLC
10C6: 69 B0     966          ADC  #$B0       ;FOR COUT1.
10C8: A2 14     967          LDX  #20
10CA: 86 24     968          STX  CH         ;HTAB 21
10CC: 20 F0 FD  969          JSR  COUT1
10CF: A5 1A     970          LDA  HDL
10D1: 4C DE 10  971          JMP  FORF2
                972
10D4: A5 1A     973 FORF1    LDA  HDL
10D6: C9 10     974          CMP  #$10
10D8: 90 0A     975          BCC  FORF3
10DA: A2 15     976          LDX  #21
10DC: 86 24     977          STX  CH         ;HTAB 22
                978
10DE: 20 DA FD  979 FORF2    JSR  PRBYTE     ;LEAVE BYTE ALONE.
10E1: 4C EE 10  980          JMP  FORD
                981
10E4: 18        982 FORF3    CLC
10E5: 69 B0     983          ADC  #$B0       ;FOR COUT1.
10E7: A2 16     984          LDX  #22
10E9: 86 24     985          STX  CH         ;HTAB 23
10EB: 20 F0 FD  986          JSR  COUT1
                987
                988 * FORMAT DELTA
                989
10EE: A5 5C     990 FORD     LDA  DTEMP
10F0: C9 80     991          CMP  #$80
10F2: 90 03     992          BCC  FORD1      ;IS D>127?
10F4: 38        993          SEC             ;THEN
10F5: E9 80     994          SBC  #$80       ;SUBTRACT 128.
                995
10F7: 20 FA 0F  996 FORD1    JSR  HEXDEC
10FA: A5 1B     997          LDA  HDH
10FC: F0 0F     998          BEQ  FORD2      ;0 IN 100'S PLACE.
10FE: 18        999          CLC
10FF: 69 B0     1000         ADC  #$B0       ;FOR COUT1.
1101: A2 1C     1001         LDX  #28
1103: 86 24     1002         STX  CH         ;HTAB 29
1105: 20 F0 FD  1003         JSR  COUT1
1108: A5 1A     1004         LDA  HDL
110A: 4C 17 11  1005         JMP  FORD3
                1006
110D: A5 1A     1007 FORD2   LDA  HDL
110F: C9 10     1008         CMP  #$10
1111: 90 0A     1009         BCC  FORD4
1113: A2 1D     1010         LDX  #29
1115: 86 24     1011         STX  CH         ;HTAB 30
                1012
1117: 20 DA FD  1013 FORD3   JSR  PRBYTE     ;LEAVE BYTE ALONE.
111A: 4C 27 11  1014         JMP  FORS
                1015
111D: 18        1016 FORD4   CLC
111E: 69 B0     1017         ADC  #$B0       ;FOR COUT1.
1120: A2 1E     1018         LDX  #30
1122: 86 24     1019         STX  CH         ;HTAB 31
1124: 20 F0 FD  1020         JSR  COUT1
                1021
                1022 * FORMAT SWEEP
                1023
1127: A5 5C     1024 FORS    LDA  DTEMP
1129: F0 22     1025         BEQ  FORS3      ;D=0
112B: C9 80     1026         CMP  #$80
112D: F0 1E     1027         BEQ  FORS3
112F: B0 0D     1028         BCS  FORS2      ;IS D>127?
1131: A2 25     1029         LDX  #37
1133: 86 24     1030         STX  CH         ;HTAB 38
1135: 20 85 0A  1031         JSR  PRINT
1138: D5 D0 00  1032         ASC  "UP"00
113B: 4C 59 11  1033         JMP  FOREND
                1034
113E: A2 23     1035 FORS2   LDX  #35
1140: 86 24     1036         STX  CH         ;HTAB 36
1142: 20 85 0A  1037         JSR  PRINT
1145: C4 CF D7  1038         ASC  "DOWN"00
1148: CE 00
114A: 4C 59 11  1039         JMP  FOREND
                1040
114D: A2 23     1041 FORS3   LDX  #35
114F: 86 24     1042         STX  CH         ;HTAB 36
1151: 20 85 0A  1043         JSR  PRINT
1154: CE CF CE  1044         ASC  "NONE"00
1157: C5 00
                1045
1159: A9 FF     1046 FOREND  LDA  #$FF
115B: 85 08     1047         STA  TEMP2
115D: 60        1048         RTS
                1049
                1050 * SPACE/ESC SUB
                1051
115E: AD 00 C0  1052 SPESC   LDA  KBD
1161: 30 01     1053         BMI  PRESS      ;KEY PRESSED?
1163: 60        1054         RTS
                1055
                1056 * WHICH ONE?
                1057
1164: 8D 10 C0  1058 PRESS   STA  KBDSTB
1167: C9 A0     1059         CMP  #$A0       ;SPACE?
1169: D0 0F     1060         BNE  ESC
                1061
```


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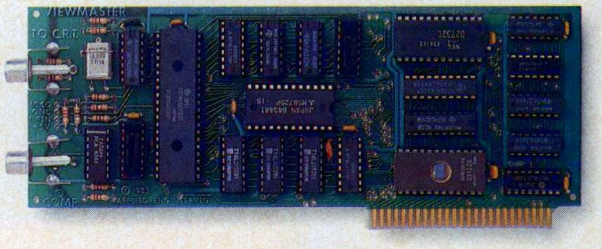

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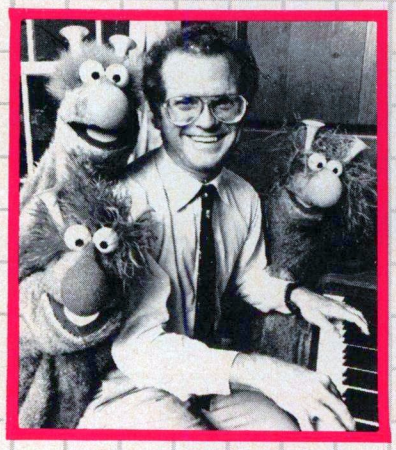

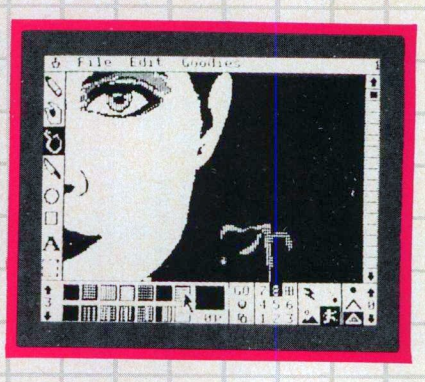

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```
116B: AD 00 C0  1062 SELOOP   LDA  KBD
116E: 30 02     1063          BMI  PRESS2
1170: 10 F9     1064          BPL  SELOOP
                1065
1172: 8D 10 C0  1066 PRESS2   STA  KBDSTB
1175: C9 A0     1067          CMP  #$A0       ;SPACE AGAIN?
1177: D0 F2     1068          BNE  SELOOP
1179: 60        1069          RTS
                1070
117A: C9 9B     1071 ESC      CMP  #$9B       ;ESC?
117C: D0 05     1072          BNE  SEEND
117E: 68        1073          PLA             ;POP.
117F: 68        1074          PLA
1180: 4C 03 08  1075          JMP  MENU
                1076
1183: 60        1077 SEEND    RTS
                1078
                1079
                              ********************************
                1081 *                              *
                1082 *   RANDOM NUMBER GENERATOR    *
                1083 *            BY                *
                1084 *      DAVID G. SPARKS         *
                1085 *                              *
                1086 * CALL -A.P.P.L.E. *  MAY 1982 *
                1087 *                              *
                              ********************************
                1089 *
1184: A5 4E     1090 INITRND  LDA  SEED
1186: 8D D7 11  1091          STA  RND
1189: A5 4F     1092          LDA  SEED+1
118B: 8D D9 11  1093          STA  RND+2
118E: 6D D7 11  1094          ADC  RND
1191: 8D D8 11  1095          STA  RND+1
1194: 0A        1096          ASL
1195: 8D DA 11  1097          STA  RND+3
1198: 65 4F     1098          ADC  SEED+1
119A: 8D DB 11  1099          STA  RND+4
119D: 4A        1100          LSR
119E: 8D DC 11  1101          STA  RND+5
11A1: 60        1102          RTS
                1103
11A2: A9 00     1104 RNDGEN   LDA  #$00
11A4: 85 52     1105          STA  XTND
11A6: 85 53     1106          STA  XTND+1
11A8: 20 BE 11  1107          JSR  RNDNUM
11AB: 85 50     1108          STA  ACC
11AD: 20 BE 11  1109          JSR  RNDNUM
11B0: 85 51     1110          STA  ACC+1
                1111
11B2: A9 00     1112          LDA  #$00       ;WANT NUMBER
11B4: 85 54     1113          STA  AUX        ;BETWEEN
11B6: A9 01     1114          LDA  #$01       ;0 - 255.
11B8: 85 55     1115          STA  AUX+1
                1116
11BA: 20 DD 11  1117          JSR  MUL
                1118
11BD: 60        1119          RTS
                1120
11BE: AD D7 11  1121 RNDNUM   LDA  RND
11C1: 38        1122          SEC
11C2: 6D DB 11  1123          ADC  RND+4
11C5: 6D DC 11  1124          ADC  RND+5
11C8: 8D D7 11  1125          STA  RND
11CB: A2 04     1126          LDX  #$04
11CD: BD D7 11  1127 NXTDGT   LDA  RND,X
11D0: 9D D8 11  1128          STA  RND+1,X
11D3: CA        1129          DEX
11D4: 10 F7     1130          BPL  NXTDGT
11D6: 60        1131          RTS
                1132
                1133 RND      DS   6
                1134
                              ********************************
                1136 *                              *
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                              ********************************
                1149 *                              *
                1150 *           TITLE:             *
                1151 *  *MULTIPLY/DIVIDE ROUTINES*  *
                1152 *                              *
                              ********************************
                1154 *
11DD: A0 10     1155 MUL      LDY  #$10       ;INDEX FOR 16 BITS
11DF: A5 50     1156 MUL2     LDA  ACC        ;ACX * AUX + XTND
11E1: 4A        1157          LSR             ; TO AC, XTND
11E2: 90 0C     1158          BCC  MUL4       ;IF NO CARRY,
11E4: 18        1159          CLC             ; NO PARTIAL PROD
11E5: A2 FE     1160          LDX  #$FE
11E7: B5 54     1161 MUL3     LDA  XTND+2,X   ;ADD MPLCND (AUX)
11E9: 75 56     1162          ADC  AUX+2,X    ;TO PARTIAL PROD
11EB: 95 54     1163          STA  XTND+2,X   ;(XTND)
11ED: E8        1164          INX
11EE: D0 F7     1165          BNE  MUL3
11F0: A2 03     1166 MUL4     LDX  #$03
11F2: 76        1167 MUL5     HEX  76
11F3: 50        1168          HEX  50
11F4: CA        1169          DEX
11F5: 10 FB     1170          BPL  MUL5
11F7: 88        1171          DEY
11F8: D0 E5     1172          BNE  MUL2
11FA: 60        1173          RTS

--End assembly, 2552 bytes, Errors: 0
```


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CIRCLE 24 READER SERVICE CARD

Locking Out Control-C

Mark Apfelstadt

WHEN preparing software for release, the final step (for me, anyway) is locking out attempted intervention on the part of the user—especially since my work is educational software, and students love to try to break into packages!

Reset trapping and ONERR catch almost all potential interruptions, save one. Pressing Ctrl-C while a program is loading, trips out into error before the first line of the new program can be executed. Even if the first statement is an ONERR pointer, the code is never given a chance to take effect.

The A.P.P.L.E Hotline and a couple of other sources made the obvious suggestion, that a POKE 214, 128 (or higher) be done at the end of the preceding program, producing an auto run when Applesoft commands are issued. That was a help, but not really satisfactory, since DOS is still active and those commands are not trapped.

Prowling around through DOS 3.3 code produced a much more satisfactory solution. The code for the RUN command basically executes a LOAD function, does some housekeeping, and then jumps to the Applesoft RUN vector to activate the program which has been loaded into memory. In order to lock out the Ctrl-C pressed during the load, it is simply a matter of clearing the keyboard strobe just before jumping to the RUN vector. I have assembled both the original code and the patched code (jumping out to an external routine for the additional instruction). The sample program is assembled at $9000, but the patch could be located anywhere, including one of the holes in DOS itself. To move the routine, just change the address pointers in DOS at $A4E0-A4E1.

```
                        1  ********************************
                        2  *
                        3  *    DOS 3.3 'RUN' code
                        4  *
                        5  *    ORIGINAL VERSION
                        6  *    -------- -------
                        7  *    1/16/86
                        8  *    MERLIN ASSEMBLER
                        9  *    MARC APFELSTADT
                       10  ********************************
                       11
                       12  SWITCH   =    $AAB6
                       13  SETRUN   =    $AAB7
                       14  LOAD     =    $A413
                       15  PRTBLNK  =    $9FC8
                       16  DOSHOOK  =    $A851
                       17  FPRUN    =    $9D58
                       18
                       19  ********************************
                       20
                       21          ORG   $A4D1
                       22
A4D1: AD B6 AA         23  RUN      LDA   SWITCH    ;Check if Applesoft active
A4D4: F0 03            24          BEQ   CONTINUE  ;if not, bypass
A4D6: 8D B7 AA         25          STA   SETRUN    ;set RUN flag
A4D9: 20 13 A4         26  CONTINUE JSR  LOAD      ;use standard LOAD code
A4DC: 20 C8 9F         27          JSR   PRTBLNK   ;print blank
A4DF: 20 51 A8         28          JSR   DOSHOOK   ;reconnect DOS
A4E2: 6C 58 9D         29          JMP   (FPRUN)   ;indirect jump to Applesoft RUN
                       30
                       31

--End assembly, 20 bytes, Errors: 0

Symbol table - alphabetical order:

   CONTINUE=$A4D9      DOSHOOK =$A851      FPRUN   =$9D58      LOAD    =$A413
   PRTBLNK =$9FC8   ?  RUN     =$A4D1      SETRUN  =$AAB7      SWITCH  =$AAB6


Symbol table - numerical order:

   FPRUN   =$9D58      PRTBLNK =$9FC8      LOAD    =$A413   ?  RUN     =$A4D1
   CONTINUE=$A4D9      DOSHOOK =$A851      SWITCH  =$AAB6      SETRUN  =$AAB7

Symbol table - alphabetical order:

   CONTINUE=$A4D9      DOSHOOK =$A851      FPRUN   =$9D58      LOAD    =$A413
   PATCH   =$9000      PRTBLNK =$9FC8   ?  RUN     =$A4D1      SETRUN  =$AAB7
   STROBE  =$C010      SWITCH  =$AAB6


Symbol table - numerical order:

   PATCH   =$9000      FPRUN   =$9D58      PRTBLNK =$9FC8      LOAD    =$A413
?  RUN     =$A4D1      CONTINUE=$A4D9      DOSHOOK =$A851      SWITCH  =$AAB6
   SETRUN  =$AAB7      STROBE  =$C010
```

```
                        1  ********************************
                        2  *
                        3  *    DOS 3.3 'RUN' code
                        4  *
                        5  *  NEW VERSION, JSR TO 'PATCH'
                        6  *
                        7  *    1/16/86
                        8  *    MERLIN PRO ASSEMBLER
                        9  *    MARC APFELSTADT
                       10  ********************************
                       11
                       12  SWITCH   =    $AAB6
                       13  SETRUN   =    $AAB7
                       14  LOAD     =    $A413
                       15  PRTBLNK  =    $9FC8
                       16  DOSHOOK  =    $A851
                       17  FPRUN    =    $9D58
                       18
                       19  STROBE   =    $C010
                       20
                       21  ********************************
                       22
                       23          ORG   $A4D1
                       24
A4D1: AD B6 AA         25  RUN      LDA   SWITCH
A4D4: F0 03            26          BEQ   CONTINUE
A4D6: 8D B7 AA         27          STA   SETRUN
A4D9: 20 13 A4         28  CONTINUE JSR  LOAD
A4DC: 20 C8 9F         29          JSR   PRTBLNK
                       30
A4DF: 20 00 90         31          JSR   PATCH      ;HERE'S THE FIX
                       32
A4E2: 6C 58 9D         33          JMP   (FPRUN)
                       34
                       35          SAV   PATCH.LINK

Object saved as PATCH.LINK,A$A4D1,L$0014

                       36
                       37  ********************************
                       38  *
                       39  *  RECONNECT (ORIGINAL INSTRUCTION)
                       40  *  THEN CLEAR STROBE BEFORE 'RUN'
                       41  *
                       42  ********************************
                       43
                       44          ORG   $9000
                       45
9000: 20 51 A8         46  PATCH    JSR   DOSHOOK
9003: 2C 10 C0         47          BIT   STROBE     ;CLEAR THE KEYBOARD!
9006: 60               48          RTS
                       49          SAV   PATCH.CODE

Object saved as PATCH.CODE,A$9000,L$0007


--End assembly, 27 bytes, Errors: 0
```

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Character Set
96 ASCII
11 x 7 International Char.
Line Spacing
6/8/12/72/144 LPI
Character Spacing
10 cpi normal; 5 cpi elongated normal; 12 cpi compressed; 6 cpi elongated compressed; 16.7 cpi condensed; 8.3 cpi elongated condensed; 5.12.5 cpi elongated proportional

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Deep in the Heart of Taxes

Ed Sachs

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For the Spreadsheet we're about to create, I used the AppleWorks integrated software program. (Other Spreadsheets are acceptable although the formula terminology may be different. Check your program instruction manual and modify accordingly.) It has all the features needed to get the job done. Figure 1 shows our end goal.

Columns H10-H14 are formatted individually by pressing Open-Apple-L, then setting Entry to Value, Fixed, and Zero decimal.

Enter the labels as shown keeping close watch as to where they begin and end (You will notice the Filing Status section of your actual 1040 is missing. This was intentional as it has no bearing on the numerical consequences). Now you are ready for the formulas. Place these into the following cells:

CELL	FORMULA
H10	@SUM(C9...E9,C10...E10)
H14	@SUM(H10...H13)
H21	+D20-G20
H38	@SUM(H18...H37)
H47	@SUM(G40...G46)
H49	+H38-H47
H52	+H49
G56	+G54+G55
H57	+G56/2
H58	@IF(H53>0,H52-H53, H52-H57)
H59	+H14*1040
H60	+H58-H59
H63	+H61+H62
H69	@SUM(G65...G68)
H70	@IF (H63-H69 <=0,0,H63-H69)
H73	+G71+G72
H74	@IF(H70-H73 <=0,0,H70-H73)
H81	@SUM(H74...H80)
H90	@SUM(G83...G89)
H92	@IF(H90>H81,H90-H8 1,0)
H93	+H92
H95	@IF(H81>H90,H81-H9 0,0)

Lights, camera, action. Get your W-2's, 1099's, what-have-you, and fill in the spaces. Fill out your Supplemental Tax Forms (which as a homework assignment you can also adapt to this Spreadsheet format) and add these numbers as well. Abracadabra. Poof! Immediate answers. Pretty darn simple huh? For fun, create split Windows using Open-Apple-W and watch your Refund (or Gulp! your Payment) increase or decrease with the changes. Some things can really make a difference. Keep at it.

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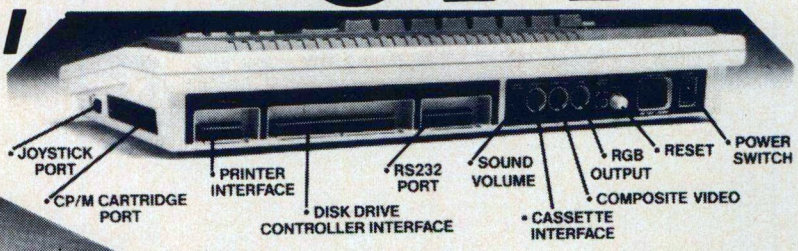

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  - — Upper and lower case characters.
  - — One of Eight colors for characters/graphics and background, Red, Green, Blue, Cyan, Magenta, Yellow, Black and White.
  - — Character set with normal, inverse and flashing capabilities.
- **GRAPHICS**
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  - — 280H X 192V 8 colors bit image — Black, White, Red, Green, Blue, Cyan, Magenta, Yellow.
  - — 560H X 192V 6 colors — Black, White, Violet, Green, Blue, Orange. (High resolution color monitor required)

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Features	Aplus 3000	Apple IIe	Commodore C-128
RAM	192K	64K	128K
Runs Apple II Software	Yes	Yes	No
Function Keys	24	None	16
4 Voice, 6 Octave Sound	Yes	No	Yes
Composite Video	Yes	Yes	Yes
Disk Drive	included	Extra Cost	Extra Cost
Numeric Keypad	included	Extra Cost	Included
Video Cable	included	Extra Cost	Extra Cost
RGB Color Card	included	Extra Cost	Included
80 Column Card	included	Extra Cost	Included
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When done, print it out, copy the results to the actual 1040, wipe your brow, and mail it away. Now stand proud and know that you've done your part in the fight for truth, justice, and the American way by giving your friend and mine, Mr. Taxman, a correctly filled out Tax Form. Then let's rejoice on how fortunate we are that April 15th only comes around just once a year.

FIGURE 1

```
       A        B        C        D        E        F        G        H
 1 | 1040 U.S. Individual Tax Return
 2 | Tax Year:
 3 |-------------------------------------------------------------------
 4 | Name:                                Your SS#:
 5 | Address:                             Spou SS#:
 6 | City:                                State:          Zip:
 7 |-------------------------------------------------------------------
 8 |                        You/Sp 65 or over  Blind                Totals
 9 | Exemptions        6a        0        0        0
10 |                    b        0        0        0
11 |                    c Dep. children who lived with you.....          0
12 |                    d Dep. children who did not live with you.....   0
13 |                    e Other dependents.....                          0
14 |                    f Total exemptions claimed.....                  0
15 |-------------------------------------------------------------------
16 |                Line                                          Amount
17 |                ----                                          ------
18 | Income            7 Wages, salaries, tips, etc.....           $0.00
19 |                   8 Interest income.....                      $0.00
20 |                  9a Divends.  $0.00      9b Exclus..  $0.00
21 |                   c Line 9b from Line 9a.....                 $0.00
22 |                  10 Refunds of State and Local taxes.....     $0.00
23 |                  11 Alimony Received.....                     $0.00
24 |                  12 Business income or (loss).....            $0.00
25 |                  13 Capital gain or (loss).....               $0.00
26 |                  14 40% cap. gain not on line 13.....         $0.00
27 |                  15 Other gains or (losses).....              $0.00
28 |                  16 Fully tax. pensions, IRA, annut. not on 17..  $0.00
29 |                 17a Other pen, annu inc. rollover.....  $0.00
30 |                   b Taxable amount.....                       $0.00
31 |                  18 Rents, royalties, part, est, trusts, etc....  $0.00
32 |                  19 Farm income or (loss).....                $0.00
33 |                 20a Unemp. comp. Total rec'd.....  $0.00
34 |                   b Taxable amount.....                       $0.00
35 |                 21a Social security benefits.....  $0.00
36 |                   b Taxable amount.....                       $0.00
37 |                  22 Other income.....                         $0.00
38 |                  23 Total income. Lines 7-22.....             $0.00
39 |-------------------------------------------------------------------
40 | Adjustments       24 Moving expense.....              $0.00
41 | to Income         25 Emp. bus. expenses.....          $0.00
42 |                   26 IRA deduction.....               $0.00
43 |                   27 Payments to a Keogh.....         $0.00
44 |                   28 Penalty on early withdrawl.....  $0.00
45 |                   29 Alimony paid.....                $0.00
46 |                   30 Deduct married couple both work....  $0.00
47 |                   31 Total adjustments. Lines 24-30.....      $0.00
48 |-------------------------------------------------------------------
49 | Adjusted          32 Subtract Line 31 from Line 23.....       $0.00
50 | Gross Income
51 |-------------------------------------------------------------------
       A        B        C        D        E        F        G        H
52 | Tax               33 Amount from line 32.....                 $0.00
53 | Computation       34a Amount from Schedule A, Line 26.....    $0.00
54 |                     b Charitable contributions.....  $0.00
55 |                     c Noncash contributions.....     $0.00
56 |                     d Add Lines 34b and 34c.....     $0.00
57 |                     e Divide 34d by 2. Enter the total.....     $0.00
58 |                   35 Subtract Line 34a or 34e from Line 33.....  $0.00
59 |                   36 $1040 X Total exemp. from Line 6f.....      $0.00
60 |                   37 Taxable income. Line 36 from Line 35.....   $0.00
61 |                   38 Tax.....                                    $0.00
62 |                   39 Addition Taxes.....                         $0.00
63 |                   40 Total. Lines 38 + 39.....                   $0.00
64 |-------------------------------------------------------------------
65 | Credits           41 Credit- child, dependent care.....  $0.00
66 |                   42 Credit- elderly, disabled.....      $0.00
67 |                   43 Resid. energy credit.....           $0.00
68 |                   44 Partial political contrib w/rec'ts. $0.00
69 |                   45 Total pers. credits. Lines 41-44.....       $0.00
70 |                   46 Line 45 from 40. Not less then 0.....       $0.00
71 |                   47 Foreign tax credit.....  $0.00
72 |                   48 General business credit.....  $0.00
73 |                   49 Total bus & other credits. Lines 47 + 48....  $0.00
74 |                   50 Line 49 from 46. Not less then 0.....       $0.00
75 |-------------------------------------------------------------------
76 | Other             51 Self-employment tax.....                    $0.00
77 | Taxes             52 Alternative minimum tax.....                $0.00
78 |                   53 Tax from recapature of investment credit....  $0.00
79 |                   54 SS tax on tip income not reported to emp....  $0.00
80 |                   55 Tax on IRA.....                             $0.00
81 |                   56 Total tax. Lines 50-55.....                 $0.00
82 |-------------------------------------------------------------------
83 | Payments          57 Federal income tax withheld.....  $0.00
84 |                   58 85 est tax pymts & amt app fr 84 re  $0.00
85 |                   59 Earned income credit.....          $0.00
86 |                   60 Amount paid with Form 4868.....    $0.00
87 |                   61 Excess SS & RRTA tax withheld.....  $0.00
88 |                   62 Credit for Fed tax on gas & fuels..  $0.00
89 |                   63 Reg Investment Company Credit.....  $0.00
90 |                   64 Total Payments. Lines 57-63.....            $0.00
91 |-------------------------------------------------------------------
92 | Refund or         65 If Line 64 > Line 56  OVERPAID AMOUNT.....  $0.00
93 | Amount            66 Amount of Line 65 to be REFUNDED TO YOU....  $0.00
94 | You Owe           67 Amt of Ln 65 to appl to 86 est tax.  $0.00
95 |                   68 If Line 56 > Line 64  AMOUNT YOU OWE.....   $0.00
96 |-------------------------------------------------------------------
```


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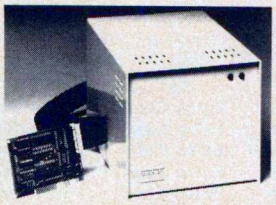

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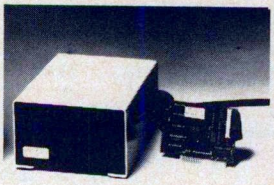

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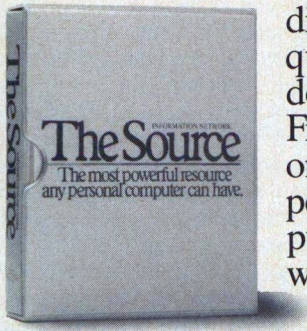

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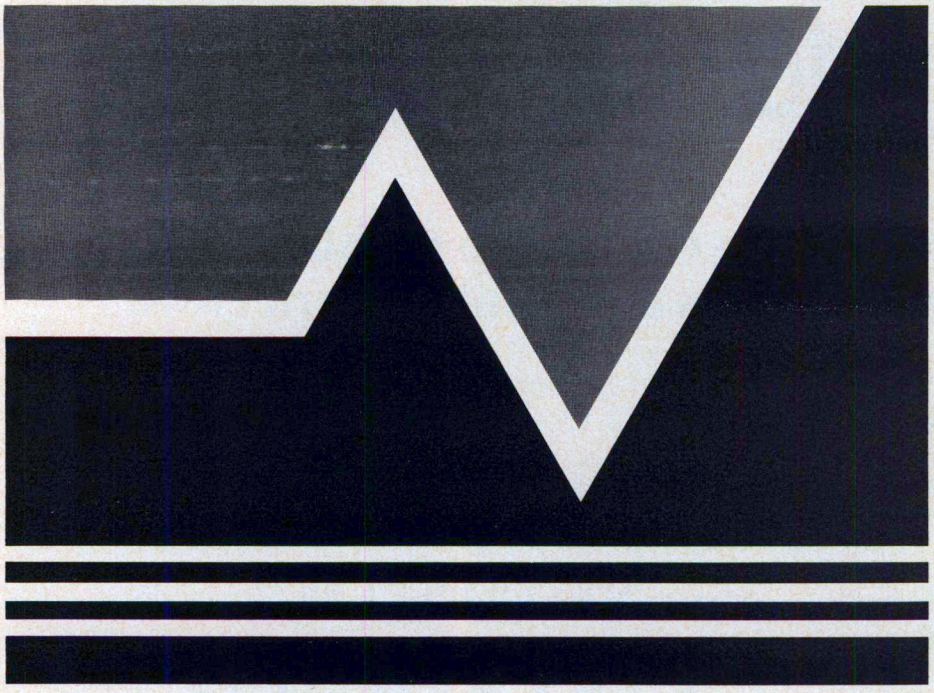
A.P.P.L.E. Doctor



Bruce F. Field

PLACE T$(6) IN UPPER STORAGE AREA

Almost a year ago I had a question on the Penultimate Input Nearly Anything Subroutine that allows you to input BASIC strings with punctuation. The reader's problem was that when the string was input, part of his BASIC program was modified. Yvan Koenig wrote from France to point out the correct solution. Part of the BASIC program in question was:

```
5085  G$ ="0" : G$ ="000" : T$(6) =
      G$
5090  FOR J = 1 TO N7 : A3 = 0 :
      FOR I = 1 TO 6 :
      CALL 880 : INPUT T$(I) : NEXT
```

The problem is that T$(6) is set equal to G$ which is defined by a string within the program. The pointers for T$(6) and G$ point to the memory area within the program that contains the 000. When Penultimate Input... is run (CALL 880), it stores the new string back where the old string was, thus modifying the program. The way out of this is to define T$(6) = MID$(G$,1) which will store T$(6) in the upper storage area.

LEAVE THE CAPS LOCK KEY UP

Q. *I am writing this letter as a result of recently upgrading from an Apple II+ to a IIe. Is there a patch for Apple Writer II that I can buy commercially or one in the public domain that will allow me to use the shift key to change case? It would also be nice to be able to use the up and down arrows and the delete key, but I've probably asked for too much already.*

A. Using the shift key with Apple Writer II on the IIe can be done without any modification at all. Press CTRL-Q to access the Additional Functions menu (as described on page 15 of the manual) and select 7 at the prompt. This was designed so that the shift key on the II+ could be used if the "shift-key modification" was made to the machine. On the IIe no modification is necessary, simply make sure that the CAPS LOCK key is in the up (lower case) position and type normally using the shift key.

You will need to modify the Additional Functions every time you start the program unless you "permanently" change the default shift key option. This can be done as described on page 72 of the Apple Writer II manual. With the Apple Writer II master diskette in drive 1, select item 4 from the Additional Functions menu. When the program prompts you for the file name, enter "SYS,D1" (without the quotes). This also makes all your current print formatting commands the default.

I am not aware of a program to modify Apple Writer II to use the arrow and delete keys.

CONFUSING BASIC STATEMENTS WITH CONTROL CHARACTERS

Q. *The Epson uses "ESC" codes to select and deselect the various print modes available. Is there a way to change from the default setting to emphasized mode while still in Apple Writer II? I have tried control V, but am not sure how to generate an escape sequence that the printer will accept. For example CHR$(27);"G" sets the double strike mode. How can I use [V] to embed the necessary string in the text file?*

A. You are not alone in your confusion, as this is probably the most asked question in history. I have answered it several times in this column but, as there are always newcomers, here it goes again. The problem arises from confusing BASIC language statements with control characters. First a few necessary explanations. Each letter on the Apple keyboard is assigned a unique number called the ASCII code number. An Apple II or II+ keyboard can generate about 94 of the possible 128 codes, (a IIe keyboard can generate them all). Obviously there are not 94 (or 128) keys on the keyboard. The way additional codes are generated is by using the modifier keys, shift and control. In order to find out how to get the keyboard to produce the codes you need, refer to a table showing the ASCII codes and the equivalent keyboard key. The first 32 codes (0-31) do not represent any printable characters, but are usually used as "control characters." What does this mean for your example? CHR$ is a BASIC function that allows you to generate all ASCII codes—even the ones that may not be realizable using the keyboard (remember you are 34 short with a II+). When the printer manual says CHR$(27);"G" sets double strike, what they mean is that you should send the code 27 and the code for "G" (47). They do not mean that you should send the string CHR$(27);"G". If you look up code 27 in a table, you find it is obtained by pressing the ESC key. Thus you should send two characters to the printer: one by pressing the ESC key, and one by pressing the G key.

So far, so good. How do you send these two characters to the printer using Apple Writer II? Unfortunately Apple Writer II

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CIRCLE 31 READER SERVICE CARD

uses most of the control codes (0-31) to control operation of the word processor. So if you try to type these characters, the program interprets them as commands and doesn't insert them in your text. To defeat this, you must first tell Apple Writer you don't want them to be commands. You do this by typing control-V. The third space on the first line of the status area at the top of the screen should now show a V. Now you are free to type control characters and have them inserted in your text. When you are finished typing control characters, type control-V again to return to normal operation. This method works *except* for 27, escape (ESC) and 16, control-V. To embed an escape you must type ESC two times, the first time it simulates changing to upper case, the second time it is embedded in the text. (For Apple Writer *//e* you must type ESC three times.) To summarize for your example, type: control-V, ESC, ESC, control-V, G.

AVAILABLE REFERENCE MANUALS

Q. *I need some good tips on replacing the reference manuals that went with the II+. I am less than satisfied with the current approach to documentation for the //e. The guides appear to be well written, but hard to come by without a heavy cash outlay. As I recall, they sure were less stingy the last time I laid out the kind of money that I just did to upgrade. Are the PEEK and POKE guides available for the enhanced (65C02) //e?*

A. Apple has made an arrangement with Addison-Wesley Publishing Co. to publish Apple manuals. Thus they should become more available, although not necessarily less expensive. I would expect to see them in bookstores, or a bookstore could probably order them for you. The following are the currently available books.

THE APPLESOFT TUTORIAL,
ISBN 0-201-17724-2 **$29.95**

THE APPLESOFT BASIC PROGRAMMER'S REFERENCE MANUAL,
ISBN 0-201-17722-6 **$22.95**

BASIC PROGRAMMING WITH PRODOS, Revised Edition,
ISBN 0-201-17721-8 **$29.95 (disk included)**

PRODOS TECHNICAL REFERENCE MANUAL,
ISBN 0-201-17728-5 **$29.95**

THE APPLE IIe TECHNICAL REFERENCE MANUAL,
ISBN 0-201-17720-X **$24.95**

INSTANT PASCAL LANGUAGE REFERENCE MANUAL,
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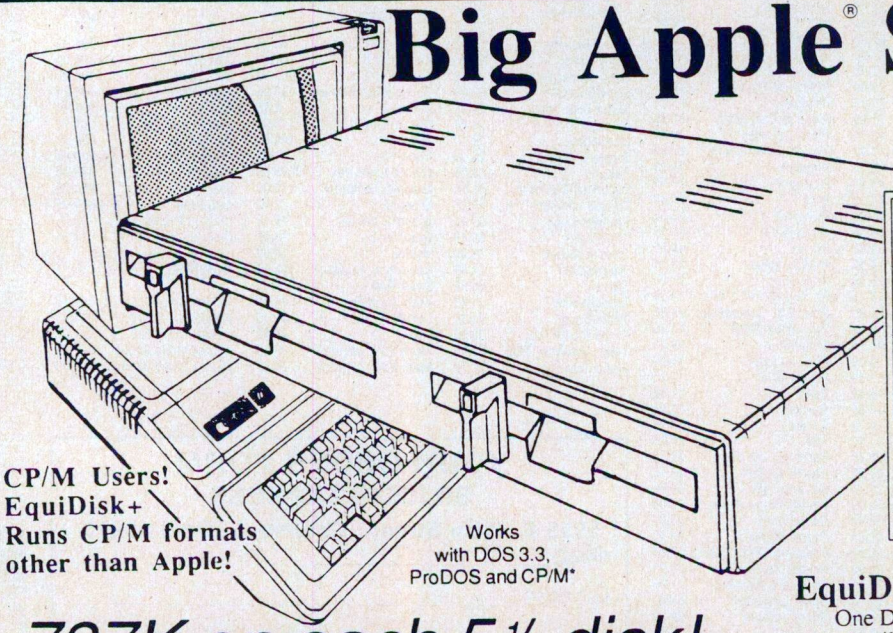

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SEE A DEMO AT YOUR DEALER

SWITCH-A-SLOT

$179.50

Designed by Joy George

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards in one slot. One of these cards is selected for use, and *only* that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with most slow to medium speed cards, such as modems, printers, clock, music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards.
Due to the nature of these products, and unit-to-unit variations of computers and peripherals, we are unable to guarantee that these products will work with any particular system. However, as with all our products, we offer a ten-day trial period. If our product does not operate to your satisfaction, return it for a prompt refund.

EXTEND-A-SLOT

The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" (45cm) cable is long enough to allow placement of the card in a convenient location. the high quality connectors are gold plated for reliability. **$34.95**

SLOT 3 CLOCK™

Designed by Chuck Shaffer

The **SLOT 3 CLOCK** will plug into any slot of the APPLE][,][+, or //e. The main feature is that, unlike most cards, it can plug into slot 3 of the //e *without interfering* with the operation of the Extended 80-column card. **PRODOS**™ is fully supported, and the card is APPLESOFT™ compatible. Installation software and a long-life DURACELL™ lithium battery are included.

$79.50

PROmGRAMER™

Hardware design by Bob Brice — Software by Bob Sander-Cederlof

The PROmGRAMER is an inexpensive **EPROM** (**E**rasable **P**rogrammable **R**ead **O**nly **M**emory) programmer for the **APPLE**][,][+, and //e computers. The unit plugs into any slot of the computer, and allows the user to program any standard 5 volt, 27 series **EPROM**. Although not intended as a production tool, the ease of use allows rapid programming, copying, duplication, or modification of **EPROM**s.

$149.50

Paddle-Adapple

The **PADDLE-ADAPPLE** is a game plug expansion adapter that plugs into the interior game I/O socket, and is designed to operate in one of two modes. In the first, it allows you select between one of two devices, such as Koala Pad™ and joystick. The device is selected by the flip of a switch. In the second mode, the **PADDLE-ADAPPLE**, with appropriate software, allows the use of two joysticks simultaneously to allow use with games such as **ONE-ON-ONE**™ and **ARCHON**™.

There are three versions to adapt to any combination of the newer type APPLE connector (the 9-pin 'D' sub-miniature), or the older 16-pin plug.

- The **PADDLE-ADAPPLE** has two 16-pin sockets.
- The **PADDLE-ADAPPLE COMBO** has one 'D' subminiature and one 16-pin connector.
- The **PADDLE-ADAPPLE 'D'** has two subminiature 'D' (9-pin) connectors.

$29.95

9-16 Adapter
for APPLE //e & //c

The 9-16 adapter permits the use of most 16-pin I/O devices with the APPLE //e or //c. Plugging this adapter into the subminiature 'D' connector allows the use of 16-pin device, such as the **PADDLE-ADAPPLE**, paddles, joystick, 16 pin Koala Pad™, etc. The only limitations are those devices that use the annunciators or the $C0400 strobe. **NOTE**–the //c does not support two joysticks. **$14.95**

16-9 Adapter
for APPLE][and][+

With this adapter, owners of early APPLEs can take advantage of the newer 9-pin game products, such as paddles, joysticks, **MUPPET LEARNING KEYS**™, etc. **NOTE** – If you have more than one game I/O device, consider purchasing our **PADDLE-ADAPPLE COMBO** or **PADDLE-ADAPPLE 'D'** instead. **$14.95**

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The actual PEEKs and POKEs that control the hardware have not changed between the regular //e and the enhanced //e, although some minor software changes have been made. The most authoritative document I have seen is the manual "About Your Enhanced Apple //e: Programmers Guide" that has a beta release number of 030-xxxx-A.

WHERE TO FIND THE MMU CHIP

Q. *I have been reading with great interest about AppleWorks and the 80-column card. I have had nothing but problems with AppleWorks since I started using it. I have never gone beyond the database in AppleWorks because I keep having problems. Originally, machine language figures would start appearing on the screen in various places; then the program would just freeze. I have had my disk drives and 80-column card replaced and am using version 1.2 of AppleWorks. I don't know what an MMU chip looks like and I couldn't find any portion of my 80-column card with the numbers listed in your article. I would appreciate any assistance you could give me. I don't have any problems with anything else or the programs I have written. It is apparent that our local dealer doesn't have a clue to what is going on, and this is getting very expensive.*

A. As I mentioned in an earlier column, if you are having problems with version 1.2 of AppleWorks and the extended 80-column card (the one with the extra 64K of memory) it could possibly be due to a faulty MMU chip. Problems have been identifed only with MMU chips that have the following date codes, 8314, 8424, 8425, and 8426. If you have problems and have an MMU with these codes, you should contact your regional Apple Service Center.

The MMU chip is one of the three large chips (2"x0.6") on the motherboard. As you open the cover you will see these three chips near the center of the opening. The MMU is the chip in the front leftmost corner of the three and has MMU lettered on the printed circuit board in front of it. On the chip are several numbers but only one should be 4 digits long, and it should be something like the above numbers — that is the date code.

CONFIGURE YOUR PRINTER

Q. *HELP!!! I have a problem with AppleWorks. I have a Grappler+ interface card and a Star Gemini 10x printer, and AppleWorks 1.2. After entering the appropriate control codes into the AppleWorks printer specification section, I still cannot get my printer to do anything but print 10 CPI. No condensed print, no superscripts, no nothing! What do I need to do in order to use all my printer capabilities with AppleWorks?*

A. In theory there should be no problem using the special features of your printer from AppleWorks (we of course know that theory has nothing whatever to do with what actually happens). The first step is to correctly set up the printer specification to tell AppleWorks what the control codes are for the special functions of your printer. Do this by selecting "Other Activities" from the main menu, then "Specify Printer Information," and then "Add a Printer." You should be presented with a list of printers for which the control codes have already been entered into AppleWorks. I believe your Star Gemini is supposed to emulate one of the Epson printers, so I would start by choosing one of them. When you get back to the word processor, press Open-Apple-O to access the Options menu and select one of the options to change the printer characteristics. If this does not work, you may have to input the specific codes for your printer back in the "Add a Printer" section. You can do this by selecting "Custom Printer" and entering the various codes to operate your printer. This information will be found in your printer manual. When you enter a code into the AppleWorks printer specification you type exactly what you want sent to the printer (see the second question of this column for more details). To send escape G (CHR$(27);'G') type ESC G and use the caret (L) to get out of the menu.

REVISION B PRODUCES DOUBLE HI-RES

Q. *What is the difference between Revision A and Revision B of the Apple IIe motherboard? Can Revision A be upgraded to Revision B?*

A. Shortly after Apple released the //e they discovered that with a small modification to the motherboard the extra memory on a 64K extended 80-column board could be used to produce double hi-res graphics (560x192). The Revision B board incorporates this modification, whereas the Revision A board is not capable of double hi-res. There is no upgrade per se, but for awhile Apple was replacing Revision A boards with B boards for no charge if you could show that you had an extended 80-column card (either Apple's or another brand). I don't know if this policy still exists but you should contact your dealer to find out.

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Write A.P.P.L.E.

Readers' forum

Ape over A.P.E.

This is just a general question for the Co-op. I recently purchased the A.P.E. program at the store without knowing anything about it. I had been a confirmed user of GPLE. After using A.P.E., I can only say that it is miles better than GPLE.

I was wondering why it seems to be such an unheralded product. I just recently came here from Phoenix and even though I avidly read the computer magazines, I never heard of the program. It seems to me that a program this good deserves better marketing.

The only other questions I have are about possible future updates of A.P.E. The only drawbacks to the program I can find is that in DOS 3.3 with the enhanced ROMs it dies when you try to use the 80 column screen. With the pre-enhancement *//e*'s it doesn't offer a very graceful way to switch back to the 40 column screen from 80 columns. Is any work being done to upgrade it to work with 80 columns in the enhanced mode?

Of course, the above problem with 80 columns I consider very minor. All in all, a superior product.

Paul G. Stout

Thanks for the compliments about A.P.E. We have many unheralded products. Our relationship with other magazines has something to do with it no doubt. How much can they afford to help their competition with free publicity? It is also our policy to put most our resources into development rather than advertising.

Regarding the 80 column problem. A.P.E. has supported 80 columns on the enhanced IIe for a long time. Stop by the store with your original for a recopy. I think the switch from 80 to 40 may remain inelegant, sorry.

If you like the program....spread the word!

Charlie Stillman
Product Development/Education

Some Further Thoughts On Piracy

In your Jan. 1986 issue of *Call* -A.P.P.L.E. on page 53 you have a letter entitled: REDUCING OR ENCOURAGING PIRACY. I agree with Mr. Dan Paymar that there is ample reason for frustration of software users. I support goals of excellence in all areas on conduct, including morality, and yet I understand the problems that users face when dealing with the software piracy dilemma. Perhaps I can offer some comments and a possible solution to the problem.

Assuming that software manufacturers can duplicate their products with great ease, they should emphasize excellence in software development and maintenance while concentrating on documentation sales for their major profits. If software manufacturers abolish copying restrictions (and even encourage the use of "illegal" copies), they will create a larger market and demand for their documentation. This policy could have some major benefits. First, they wouldn't have to continue to spend money on improving software protection devices. Second, the problem of piracy would be eliminated so money could be saved as the pursuit of "pirates" could be stopped, since they would no longer exist. Third, the market for documentation would be far greater and companies could sell more of this material. Fourth, users could make backup copies of their software without restrictions, either technical or legal. Fifth, the incentive for piracy would be eliminated as software prices would be lowered because: 1) more software could be sold over a broader purchase base, 2) money invested in the pursuit of pirates and development of protection devices could be invested in better software and also used to offset high software costs. It should be clear that if there is a higher number of people that use a specific software package (either legal or otherwise), then there will be a greater demand for the documentation for that package.

When a software package costs several hundred dollars and copies can be made easily and given away or sold for the cost of the blank disk, people will continue to purchase, or obtain in other ways, these copies. It may not be morally sound, but this remains the case. The race between companies that produce such utilities as LOCKSMITH and COPY II+ and the software vendors is a direct parallel with the continuing race in military history between offensive and defensive weapons systems. This race will continue regardless of the legal and moral restrictions which we place on ourselves, at least until the AI people develop software that is

self-replicating, self-producing and self-diagnostic.

If the software vendors can reduce the price of their magnetic media and encourage the growth of the documentation market, then they can eliminate the piracy problem and continue to make a profit. I believe that most people would rather purchase the documentation than photocopy it. The software vendors should closely examine the record industry's reaction to the development and distribution of tape recorder technology in the early 1960's.

I believe that the main goal of the user community is to develop its capabilities and use this technology to its maximum potential. We're always working on improving our skills and techniques in the handling of information, either programs or data. Most programs are either useless, or made largely impotent without documentation. If software companies realized this, they would encourage people to acquire and use their software in any way possible so they could provide the appropriate documentation for initial systems as well as updates.

I would be interested in knowing if other people agree with this proposal. I look forward to hearing from both users and vendors on this issue either in your publication or otherwise.

Daniel Parker

Speed and Numerical Precision with ZBASIC

The review of ZBASIC in the March '86 issue of *Call -A.P.P.L.E.* covered the good news. And, the strong points of ZBASIC are very good indeed. However, my reason for using ZBASIC was the great numerical precision (up to 54 places) and, I thought, its speed. Unfortunately, ZBASIC does real number arithmetic in binary coded decimal which is inherently inefficient and slow.

To compare ZBASIC with Applesoft in doing real number arithmetic, I took as an example a differential equation to be solved using a simple finite difference method. I set single precision to eight places (only an even number of places required to step through the solution was 15 seconds with Applesoft and 75 seconds with ZBASIC.

Now why is ZBASIC so fast doing the Sieve of Eratosthenes? Because ZBASIC defaults to integer arithmetic which it does very fast. It is claimed to be 100 to 200 times faster than floating point. On the other hand, Applesoft does all of its arithmetic with real numbers and then if the type declaration requires, it converts the numbers to integers, a slow process. In fact, the Applesoft manual says that this is the single most important consideration in regard to execution speed. Consequently this comparison is very misleading. ZBASIC is shown at its best and Applesoft at its worst.

The review also mentioned that mistakes in using the editing keys can force you out of 80 column mode into 40 column. The mistake is in pressing the Right-Arrow key while in the insert mode. The Right-Arrow key has the ASCII value 21 which is one of the characters used for exiting the 80 column mode. The solution to this problem is never use the Right-Arrow key when editing ZBASIC, use the space bar instead.

James E. Erickson

Recycle that II+ Fan

Back when I got my first Apple II+ computer you sold a nifty little three inch fan that set right inside the computer. I bought one and it worked very well at keeping my computer cool. When I got my *//e* it didn't fit so the fan was put on the shelf while all five of the cards that I use were transferred to the new machine. It wasn't very long before my new IIe began to show the signs of overheating. I was about to buy a new fan but when I saw the price I thought I'd give my old fan one more chance. Much to my delight I have found a place for it. If you move the speaker from where it sits next to the power supply there is just enough room to set the fan in it's place.

I took the computer apart and drilled three holes (the vent slot made the fourth) for the mounting bolts. I used four ¾ inch 8-32 bolts and cut four bushings out of some nylon tubing to raise the fan ¼ inch off the base. It's a tight fit, therefore, on the edge next to the keyboard I placed some adhesive backed foam tape (the same stuff that originally came with the fan) to make sure there were no shorts. The cord for the fan tucks behind the power supply and comes out the hole at the back. The speaker I remounted over to the right on the vent openings using some insulated wire twisted until it was tight. I have had the fan in now for over nine months and it has worked great.

Bruce Walker

Hackers to the Rescue?

I am a professional writer who pursues his craft using various models of the Apple II. Trying to find a genuinely good word processor for this family of machines (and I've tried them all) is like trying to track down the Holy Grail.

I wonder: has anyone thought about adding macros to the AppleWorks word processor? If Pinpoint can find a way to monitor AppleWorks keystrokes, it seems that the possibility for macro development exists. Any takers among the hackers?

Hal Barwood

Write it once!

MasterFORTH

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Appearing in the April 1986 Mac A.P.P.L.E.

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Our first report on using the Mac Plus.

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Call-A.P.P.L.E. welcomes letters from its readers on any topic relating to the magazine's content, A.P.P.L.E. services, experiences with hardware and software, current issues in computing, or programming notes. Because of space limitations not all letters can be selected for publication or printed in their entirety, but we try to present a representative sample of your views. If you would like your address published, please include it near your signature.

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WANTED: FOR PUBLICATION

We are thinking of including a "Coming Events" section in the magazine for conferences, trade shows, meetings, etc., that would have a broad regional, national, or international interest among Apple users. Please send details at least 2 or 3 months in advance to our Editorial Office.

We are also looking for well-written, timely reviews and tutorials on current software, hardware, and programming languages. Products sold through A.P.P.L.E. Co-op, or advertised in Apple-specific magazines, would be of particular interest to our readers.

UniDOS 3.3
For the Apple UniDisk 3.5

Apple's new 800K UniDisk drive gives you five times the storage capacity of floppy disks — but no DOS 3.3. Now you can have it — with UniDOS 3.3!

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- Uses only 1K of user memory.
- Developer licenses are available.
- For the Apple II Plus, //e and //c

* Note: Full compatibility with Applesoft programs. However, UniDOS 3.3 may not operate correctly with machine language utility programs that directly use DOS 3.3 internal routines. Apple and UniDisk 3.5 are registered trademarks of Apple Computer, Inc.

CIRCLE 33 READER SERVICE CARD

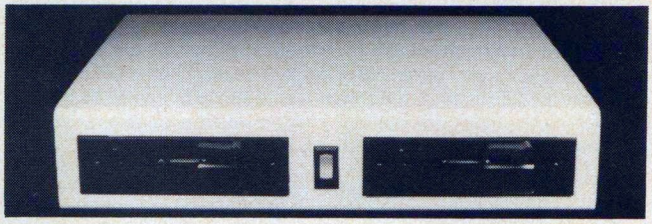
THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E. Further information about items appearing in The Marketplace can be obtained through the Reader Service Card. If you contact any manufacturers directly, please mention that you learned about them in *Call-A.P.P.L.E.*

INCREASE DATA STORAGE

EquiDisk

The EquiDisk + is designed to work with Apple II + and *IIe* computers equipped with 64K of RAM. The user's manual explains, step-by-step, how to install the controller card and the high-capacity drives. The software provides the user with EquiDisk + start-up, formatting and copy routines.



Installation of the EquiDisk + does not require any modification to existing circuitry nor is there any extensive equipment to hook up. The EquiDisk + simply plugs into the Apple and becomes part of the entire system. *H&M Disk Drive Services, Inc., 1101 East Pacifico Ave., Anaheim, CA 92805, (714) 385-1146.* CIRCLE 50 READER SERVICE CARD

MicroStor

AST Research, Inc. announces the addition of 20 megabyte hard disk/tape backup subsystem to its MicroStor line of products. The only line of mass storage subsystems for the Apple *IIe* to utilize 3.5-inch Winchester and tape drives, AST's MicroStor products are fully compatible with software written for ProDOS, DOS 3.3, Apple II Pascal and CP/M operating systems.

Both the 10 and 20 megabyte optional MicroStor tape backup units consist of a 3.5-inch data cartridge tape drive which may be purchased with the subsystem or easily installed at a later date. Supporting either mirror image backup/ restore or file-oriented operations, the MicroStor tape unit employs 3M DC-1000 mini tape cartridges. Users have the option to purchase certified and formatted cartridges directly from AST, or purchase blank tapes from dealers and format them with the utility program provided with the system.

Backup II, licensed from Apple, is one of a series of software utilities included with all MicroStor units. Compatible with ProDOS, Backup II facilitates volume/file-oriented disk backup and restore operations. Streaming tape backup, hard disk formatting, and tape initializing utilities are also provided with MicroStor products. *AST Research, Inc., 2121 Alton Avenue, Irvine, CA 92714. (714) 720-1824.*

CIRCLE 51 READER SERVICE CARD

OUTLINING MADE EASY

Outline Processor with CP/M

KAMASOFT, Inc. introduces OUT-THINK a new, low cost alternative for outline processing on CP/M computers. OUT-THINK lets you classify text into a familiar, outline structure and then alter and access the text based on that structure. It allows you to hide details and focus on how your main ideas fit together as you create and develop written material. Levels of the outline can be collapsed off the screen, hiding them from view, and then expanded back into view for editing.

In addition to a full screen outline editor with collapse and expand, OUT-THINK offers a full screen text editor for inserting and editing text in the outline. A full complement of copy and move operations are provided, including copying within and between outlines and marking groups of titles in the outline for copying, printing, or deleting.

You can directly read and write text files compatible with most popular word processors. And you can print the outline with over 20 different formatting parameters, including headers and footers, page numbers, section numbers, and an automatic table of contents.

Additional features include a built-in file manager, information retrieval by keyword, date and time stamping, and password security on outline files.

OUT-THINK can be installed to run on practically any CP/M (Version 2.2 or above) computer, including systems with the 8080, 8085, and Z80 processors, as well as many CP/M emulators running on the IBM PC. It requires at least 48K of free RAM space and an 80 column by 24 line screen. Price: $49.95. *KAMASOFT, Inc., 2525 SW 224th Ave., Aloha, OR 97006, (503) 649-3765.* CIRCLE 52 READER SERVICE CARD

ThinkWorks with AppleWorks

Megahaus Corporation announces a new addition to its popular AppleWorks compatible software family, ThinkWorks. ThinkWorks offers Apple *IIe* and *IIc* owners the most powerful outlining program available for their computers. Like the best selling MegaWorks and ReportWorks programs, ThinkWorks is fully AppleWorks compatible. AppleWorks users will recognize ThinkWorks easy commands and familiar card file format.

ThinkWorks is designed to be used by itself or in conjunction with AppleWorks. ThinkWorks lets you construct, rearrange, expand and collapse outlines, search and replace text, and enter paragraphs for any entry. ThinkWorks uses standard outline labeling (i.e. Roman numerals, letters, numbers) and indents each level of your outline automatically. These outlines are easy to read and can often be used in place of memos or reports. Any outline created by ThinkWorks can be read by the AppleWorks word processor. This allows users to organize ideas and thoughts using the powerful tools inside ThinkWorks, and insert their outline into an existing document, or develop it into a new document using the AppleWorks word processor.

One of the unique features which makes ThinkWorks the most powerful Apple II outlining program is the ability to merge one outline into another. You can extract all or part of an outline created earlier, and insert it anywhere in your existing outline, so you don't have to retype entries. ThinkWorks does the work for you, making you more productive. Another unique feature is the ability to save a portion of an existing outline for later use.

ThinkWorks requires an Enhanced Apple *IIe* (with extended memory 80 column card) or Apple *IIc*. ThinkWorks takes full advantage of the new Apple II Memory Expansion Card and is compatible with Profile, UniDisk 3.5 and Catalyst. Price: $125.00. *Megahaus Corporation, 5703 Oberlin Drive, San Diego, CA 92121, (619) 450-1230.*

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Compare these features with other AppleWorks patch programs

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THREE NEW BIOLOGY SIMULATIONS

Q.E.D. Computing announces the release of BEE-CAUSE, NATURAL CAUSES and DESIGNER GENES. These programs are exciting new simulations for use in high school biology or life science classroom. Only a minimal knowledge of the computer is needed to allow the student to interact with the program.

Bee-Cause

This program acquaints the student with the scientific method of hypothesis formation, testing, data collection and interpretation. The student generates an hypothesis and conducts a series of experiments designed to validate that hypothesis.

The student learns the scientific method while trying to determine what characteristics of a flower attract bees. Three flowers are shown on the high resolution graphics screen. A bee travels across the screen and visits those flowers it is attracted to. By selecting various attributes of the flowers and conducting a series of experiments, the student determines what features attract the bee. Price: $40.00.

Natural Causes

This is a series of simulations designed to introduce the biology student to the interrelationships between predator, prey and environment. The program is divided into three tutorials and four simulations. Each simulation presents increasingly complex concepts about population studies. The first two simulations gradually introduce immigration, emigration, mortality, natality, carrying capacity, and the effects of severe weather and disease on the moose population. Simulation three develops the predator/prey relationship. The fourth, and most complex simulation combines the effects of all the above topics. In each simulation, the student specifies initial conditions and a high resolution graphics plot of the population as a function of time is generated. $50.00

Designer Genes

This is a basic introduction to the study of heredity and human genetics. Along with studying basic genetics concepts, the student also becomes familiar with many physical traits they may not have known were hereditary. It contains two tutorials and three Punnett Square simulation sections. The tutorials introduce basic genetics concepts. The Punnett Square sections progressively introduce simple alleles, multiple alleles and sex-linked alleles. The student chooses from a list of several genes and the computer generates either a monohybrid or dihybird cross. A Punnett Square is drawn and the student is asked to provide the missing genotypes of either the first or second generation. Each simulation also includes an interactive question and answer section to reinforce the presentation. Price: $50.00

Each program package includes an unprotected disk and a fully documented Teacher's Manual. The manual describes the operation and theory of the program along with suggested applications. *Q.E.D. Computing, P.O. Box 5037, Kent, WA 98064-5037.*

CIRCLE 54 READER SERVICE CARD

ROBOTIC CONSTRUCTION SETS

The Multibot master electronics module connects to the computer and comprises the heart of the Multibot sets. This module provides the connection between the computer and the outside world, and can be expanded as new Multibot sets are developed and released. Some Multibot sets include connectors, gears, shafts and other components which permit users to construct hundreds of robotic devices that can be controlled with the computer.

The MULTIBOT S100 set features hardware and software for practical experiments and projects in speech digitization and playback and for using the computer as a digital voltmeter. The MULTIBOT M100 set features digital storage oscilloscope and digital voltmeter hardware and software; the MULTIBOT MB220 set, in addition to containing everything found in the S100 and M100 sets, also includes snap-together plastic components, gears, shafts, connectors and two electric motors which permit the user to construct dozens of robotic devices and control them with the computer. The MULTIBOT MB330 set contains everything found in the MB220 set plus additional mechanical componentry, interface connectors for using Lego, Robotix and Capsela parts, and a third electric motor for constructing hundreds of complex devices and projects.

Prices range from $59.95 to $199.95 for the sets and they are available at computer, software and specialty stores. *Multibotics, Inc., 2561 South 1560 West, Woods Cross, UT 84087, (801) 298-9077.*

CIRCLE 55 READER SERVICE CARD

LEARN PROPERTIES OF MATTER

PARTICLES OF MATTER: SOLIDS is a software and print-based Learning Module designed to teach key concepts in the junior high school science curriculum. The module incorporates current learning theory and utilizes a discovery approach. The module contains a Program Disk and a Student Guide. The disk-based interactive tutorials are integrated with student guide-directed experimentation. A disk-based quiz is provided. The module introduces the particle model of matter and develops these concepts to explain many properties of matter. The package includes a Teacher's Guide to curriculum integration. Price: $35. *FULCRUM SOFTWARE, 8945 SW 177 Terrace, Miami, FL 33157.*

CIRCLE 56 READER SERVICE CARD

BUSINESS ILLUSTRATIONS FOR THE NEWSROOM

Springboard Software Inc. has created a collection of business illustrations for use with its best-selling program, The Newsroom. Clip Art Collection, Volume 2, now available in stores, features a library of more than 800 illustrations designed specifically for businesses, large and small, to use in creating business and office-oriented publications with The Newsroom.

Clip Art Collection, Volume 2 features illustrations in a variety of categories, including medicine, accounting, photography, audio, money, computers, symbols, realty, industry, office and many others.

The program can be used in conjunction with The Newsroom's original art or any art from Clip Art Collection, Volume 1. Price: $39.95. *Springboard Software, Inc., 7808 Creekridge Circle, Minneapolis, MN 55435, (612) 944-3915.* CIRCLE 57 READER SERVICE CARD

A JOB READINESS SERIES

MCE Inc. announces four new programs in the JOB READINESS SERIES designed for use with the Apple II computers. JOB ATTITUDES: ASSESSMENT AND IMPROVEMENT, FILLING OUR JOB APPLICATIONS, SUCCESSFUL JOB INTERVIEWING, and RESUMES MADE EASY. The complete series retails for $199.95.

JOB ATTITUDES: ASSESSMENT AND IMPROVEMENT

This program assesses attitudes in familiar situations, discusses attitudes appropriate to the vast majority of employment situations, and assesses student attitudes of primary importance to job success: confidence, cooperation, motivation, and responsibility.

Students receive a printout of the results of both pre and post-test segments to indicate progress made and where work is needed. Price: $54.95.

FILLING OUT JOB APPLICATIONS

This educational program aids students in filling out job application forms. Each section of the application is discussed and examples of appropriate answers are given. The student's responses are continually stored and appear on the application/printout which is available following the running of the program.

A sample application form is included with the program documentation for use as a pre- and/or post-test. It is suggested that students use their completed aplication form as reference when applying for jobs. Price: $54.95

SUCCESSFUL JOB INTERVIEWING

This program is an interactive presentation and discussion which covers: how to prepare for interviews, problems encountered during the process, ways of handling tough questions, and how to follow-up the interview so as to maximize chances of employment. Price: $54.95

RESUMES MADE EASY

This program aids students in writing their own resumes. They interact with the program's instructional sections which cover: what's included in a resume, how to determine what kind of a resume is best for you, the specifics in writing a chronological resume, and how to prepare a functional resume. The menu also includes the option of preparing one's own resume. Students are led through the resume of their choice and are prompted to include all necessary personal information. Upon completion, a printout is made available. Price: $54.95. *MCE Inc., 157 S. Kalamazoo Mall, Suite 250, Kalamazoo, MI 49007, 800-421-4157.*

CIRCLE 58 READER SERVICE CARD

MODEM MGR™

MODEM MGR is a new modem communications program for the Apple][+, //e, enhanced //e, and //c. It supports most serial cards and internal or external "smart" or dumb modems at baud rates from 110 to 19200 baud.

MODEM MGR provides a large buffer to capture received text for reviewing, editing, saving to a disk file, or re-transmitting.

FEATURES: Modem control (dial, answer, hangup, where applicable), full-screen editor, programmed operation with macro script files, programmable function keys, XMODEM file transfers, error-free transfer of DOS 3.3 or ProDOS files, efficient transfer of sparse random-access files, unattended option with password protection, terminal emulation (DEC VT-52, DG D200, etc.), help screens, screen capture (snapshot), full- or split-screen display with block send (for CB, chat, or packet radio), continuous on-screen display of time-of-day or elapsed time (with some clock cards), auto XON/XOFF, auto disk save, carrier control or "smart" modem control, programmed dialing (from phone directory, function key, or macro script file), printing (from disk file, capture buffer, or online), and many other features.

MODEM MGR is fast. With a Videx 80-column card, it will receive and display ordinary text at baud rates up to 19200 baud continuously (non-stop) without losing any characters.

MODEM MGR supports Apple 40-column, Apple 80-column, Videx Videoterm or Ultraterm (all eight video modes), most printer, serial, multi-function, and modem cards, most external "smart", auto, or dumb modems, and some clock cards. The programs are supplied on both sides of three 5-1/4" disks (six sides) and are not copy protected. Instruction manual (284 pages) and both DOS 3.3 and ProDOS versions for only

$50

plus sales tax (Calif. residents) plus $3 shipping. Not available in any store. Send check to:

MGR Software
Suite 101
305 South State College Blvd.
Anaheim, CA 92806
(714) 993-0294

CIRCLE 28 READER SERVICE CARD

BARCODE PRODUCTS AND COLOR BOARD

Barcode Labeling System

This system can be used to print your own labels. The BLS (Barcode Labeling System) can currently print the American UPCA 12 digit code, the European 8 or 13 digit Eana code and Code 3 of 9 (Logmars). In addition to the Barcode itself, two lines of text may be printed above the code. The barcode digits or alphanumerics are printed below the barcode. Labels can be stored on disk and edited for future requirements.

The Barcode Labeling System is provided on a DOS 3.3 disk with complete instructions for use. Hardware required: Apple IIe or II+, one disk drive, video monitor, printer interface card, Epson graphics series printers, label paper. Price: $349.00.

Barcode Reader

Barcode reader for the Apple IIe and II+ is a resident barcode reader using a Hewlett-Packard wand. The wand plugs into the game port. The reader comes with a disk and instruction manual. It will read the American UPCA 12 digit code and the European 8 or 13 digit Eana code. Price: $199.00.

Stand Alone Barcode Reader

The new Telemax Stand Alone Barcode Reader (SABRU) has been designed to enable all computers to read barcode labels. The unit contains its own CPU and may be operated from AC power or a battery. The barwand is wiped across the barcode label in either direction. Within $\frac{1}{10}$ second, the barcode is decoded and sent to the computer via the RS232 line as ASCII characters. Serial data bits, parity and baud rate can be set to suit serial RS232 input of the host computer. The Telemax SABRU will read the following codes: 8/13 European Eana, American UPCA 12 digit, 3 of 9 (Military), 2 of 7; 2 of 5, Interleaved; Plessey barcodes, which are used in libraries. Options: A realtime battery backup clock to provide current date and time as part of the barcode characters. CMOS RAM for storing quantities of barcodes read, with totals. An additional feature is a plug on radio tranceiver for the reader and the host computer. The price for the TELEMAX SABRU is $595.00.

Kaleidoscope II

Another new product, The Kaleidoscope II is an RGB color board for the Apple IIe and II+ computers. The board has a two page memory operating system for programming both foreground and background colors. You can set each line of text to one of eight foreground and background colors. The Kaleidoscope II plugs into slot 7. It lets you use any 80 column card. For the Apple II+ you can use the model VSS-80 softswitch or the VSP-80 switchplate options to interface 80 column board to the Kaleidoscope II. Apple versions of the Kaleidoscope II sell for $199. The VSS-80 is $45.00. *TELEMAX, INC., 780 Lorraine Dr., Warrington, PA 18976 (215) 343-3000.*

CIRCLE 59 READER SERVICE CARD

A LIBRARY AIDE

BOOK TRAK I is a hard disk library circulation system using an Apple *IIe* computer with 10, 20, or 30 Megabyte hard disk. Records status of materials (up to 250,000 items) and patrons (up to 55,000 patrons/2,400 staff) through bar code labels. Prints overdue lists/notices. No limit to number of overdues or holds.

BOOK TRAK I provides generous fields for data entry, allowing the library to establish many alternative loan periods and subject categories. It also allows rapid (2-4 sec.), flexible searching of data base. It can search items by Call Number, Author, Title, Subject Category, ISBN, and LC number. Can search Patron/Staff by Name, City, State, Zip, Grade, and Homeroom.

Multiple overlay of "windows" enables user to consult directions, temporarily switch functions, or search data base, and then return to original task without disturbing work flow. Date/Time is displayed and due dates are automatically calculated with the installed clock card.

BOOK TRAK I will print hard copy of any screen display, keep extensive use statistics, and automate inventory. Price: $850. *Richmond Software Corp. 1650 S. Amphlett Blvd., Suite 205, San Mateo, CA 94402, (415) 348-0768.*

CIRCLE 60 READER SERVICE CARD

MUSIC TUTORIAL AND DRILL PROGRAMS

Music Fundamentals is a flexible package of tutorial and drill programs designed to provide students with the aural component needed to complement knowledge gained from any beginning music theory text.

It provides:

- QUICK lesson selection from screen menu
- CLEAR on-screen instructions
- SIMPLE operation
- EXCITING visuals, minimal text
- INSTRUCTIVE feedback
- STRAIGHTFORWARD presentation of material

Each program contains multiple musical examples, and the materials on each disk are organized in order of relative difficulty for the task or specific musical element involved. The materials are grouped by musical function:

- Harmony
- Interval
- Melodic Concepts
- Meter/Rhythm
- Scale Drills

Music Fundamentals features the following:

- sequential material structure goes from simple to complex so students can proceed with minimal supervision
- each program contains randomly-ordered examples so students can use each program numerous times without memorizing a sequence of answers
- flexible run options allow students to meet their individual needs by controlling tempo, program delays, and other operational decisions
- programs accept a minimum of typed input: touch-typing skills are *not* required

Music Fundamentals runs on the Apple II Plus, *IIe*, or II (with 48K and an Applesoft Language Card). Required hardware includes an MMI Music Board or an S.A.M. DAC Board, and speakers or headphones. Complete with nine disks (tenative), and Users Manual. Price: $300. *Wm. C. Brown Publishers, 2460 Kerper Blvd., Dubuque, IA 52001, (319) 588-1451.*

CIRCLE 61 READER SERVICE CARD

ACOUSTICAL PRINTER COVERS

Eagle Data Products introduces a full line of printer sound covers designed to eliminate up to 90% of the clatter generated by computer driven printers. Covers are available for most daisy wheel and dot-matrix printers. The Quiet Cap sound covers come standard with built in A/C outlet, lighted power switch and high efficiency cooling fan. The Value Line sound covers are economy models of the Quiet Cap's, with prices starting at 99.00.

All covers are available in the "Roll Around" version, with castors for mobility, and a floor standing base under the cover for paper and supply storage. All Eagle Data sound covers are available in Walnut, Putty and Oak. *Eagle Data Products, 400 Elm Street, Holly, MI 48442, (313) 634-0990.*

CIRCLE 62 READER SERVICE CARD

SILENCE IS GOLDEN

LITTLEJACK is an ultralight headphone set that allows you to work or play at your Apple II, II+, or *//e* without disturbing anyone. The headphones, jack and adapter are easy to install. LITTLEJACK is ideal for use with programs that produce music or sound effects.

LITTLEJACK can also serve as an economical stereo hookup or as an aid for the hearing impaired. The package includes an adapter that allows up to eight students to listen at once on school headphone listening sets. Price: $24.95. *Educational Software Review, 1400 Shattuck Ave., Suite 774, Berkeley, CA 94709, (415) 528-2788.*

CIRCLE 63 READER SERVICE CARD

ONE FINGER CHORDS

Synthestra is a MIDI sequencer and controller program for the Apple *//e*, II+ designed to bring a complete MIDI system under the control of one "master keyboard." Synthestra is designed so that each key on the user-designated master keyboard may be independently assigned to any voice (preset) of any synthesizer in their MIDI system. Up to sixteen MIDI keyboards, drum machines, expanders, or other MIDI devices may be controlled from one keyboard. Synthestra supports unlimited keyboard splitting, doubling or layering, and echoing.

The built in sequencer supports 100 sequences with 16 tracks each. With synthestra's "master keyboard control" philosophy, any key can be assigned to start, stop, loop, and sync any sequence or combination of sequences. This feature provides for unlimited "one finger" chords and sequences, one finger special effects, or control and synchronization of drum machines and other MIDI devices.

The Synthestra program is expandable with add-on software "modules" providing unique specialized functions, some customized to popular synthesizers. One general purpose module is included free with Synthestra.

The Synthestra software program includes an operator's manual, quick reference card and software on diskette. Synthestra requires a 64K Apple *//e* or II+, a MIDI interface card and at least 1 MIDI equipped keyboard. Price: $120.00. *Decillionix, P.O. Box 70985, Sunnyvale, CA 94086, (408) 732-7758.*

CIRCLE 64 READER SERVICE CARD

OUR APPLES TEACH US MUSIC

Computers & ME, Ltd. releases its Note-Us computer sight-reading series. Note-Us is designed to teach the reading of music through the use of an Apple II computer and a 4 or more octave MIDI synthesizer keyboard.

The computer is used to display the music staff, notes and instructions to the student. It is also used to check the accuracy of the playing. When inaccurate notes are played, the computer signals the student and requests the playing of the proper notes. To reinforce the video screen display, there are 25 original music examples composed by CME and packaged in the easy-to-read software manual.

To use the Note-Us series, the following is required:

- Apple II, II+, or *//e* computer with video monitor.
- Disk Drive.
- Stereo amplifier and speakers or synthesizer with built-in amplifier and speakers. (Headphones are optional.)
- MIDI equipped synthesizer with 4 or more octave keyboard.
- Passport Designs or Yamaha MIDI interface card.

Computers & ME, Ltd.,Ashbrook Road, Exeter, NH 03833-9733, (603) 772-4399.

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WANTED—Non-profit organization seeks Apple computers or compatibles, software and hardware for teaching children. Donations are tax-deductible. Call Bob Sackett (206) 246-7153, Seattle or send equipment to 13033 Occidental So., Seattle, WA 98168.

GRAPHICS, MATH/CHEMISTRY WITH APPLEWRITER $39—The only fully integrated co-resident enhancement for Applewriter II to print graphics (formulas, symbols, graphs, pictures, etc) with text, change fonts. Supporting graphics utilities (Fonts, Shapes, Graphics Assembler, Screen dumps) FREE!! Requires 128K IIe or IIc. Configured for Okidata 92P. Other dotmatrix printers, write: MMR, 32 Sunset Drive, Whippany, NJ 07981, or Call (201) 887-0839.

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Undeleting Deletions in "ProDOS Undelete"

The listing of ProDOS.UNDELETE in our February 1986 issue, pp. 24-27, had two inadvertent deletions. The program will run better if you substitute the following two lines for those originally printed in the listing:

```
240  PRINT "press any key to continue!": GET ZZ$ : RESTORE

810  B = B + 1 : IF B = 280 THEN B = 7 : EFLAG = 1 : HI = 0

1020 CD = WR : BF = 8 : FOR BL = 2 To 6 : GOSUB 90: BF = BF + 2 : NEXT
```


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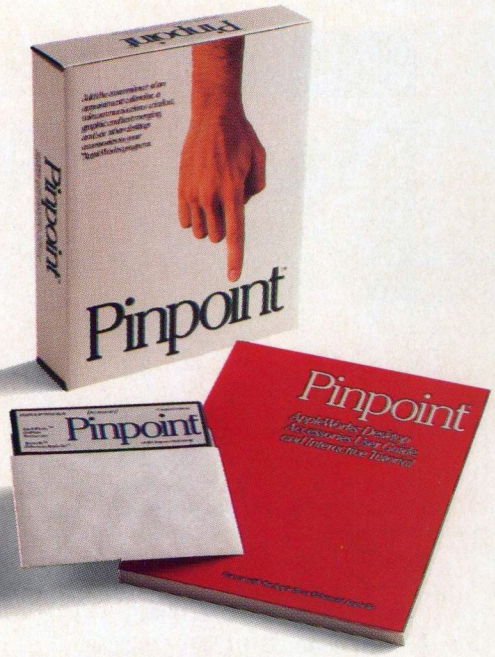

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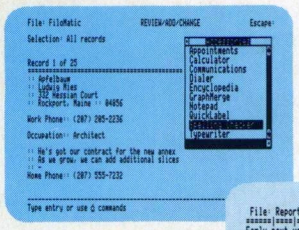

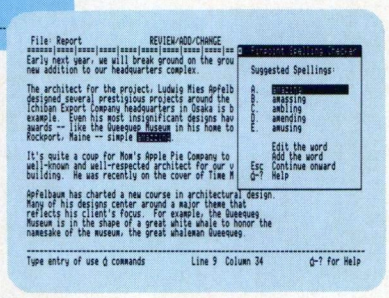
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building. He was recently on the cover of Time M
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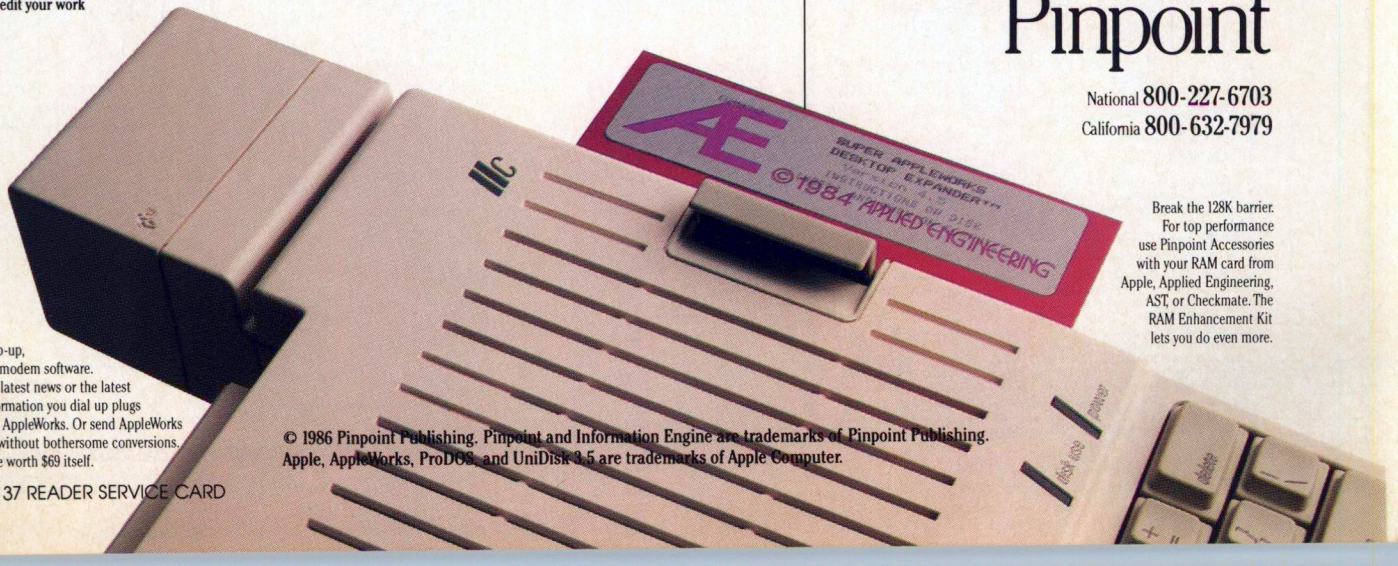

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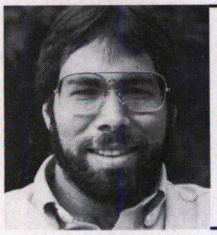

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